#4

FEDERAL
(February 1985)

Permit Number ACT/015/009, Feb. 19, 1985

STATE OF UTAH
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING
355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203
(801) 538-5340

This permit, ACT/015/009, which incorporates the Office of Surface Mining (OSM) Permit UT-0017, is issued for the state of Utah by the Utah Division of Oil, Gas and Mining (DOGM) to:

Trail Mountain Coal Company
P. O. Box 370
Orangeville, Utah 84537

for the Trail Mountain Mine. Trail Mountain Coal Company is the lessee of federal coal lease U-082996, the lessee of state coal leases ML-22603, and/or the lessee/owner of certain fee-owned parcels, 53 acres. The permit is not valid until a performance bond is filed with the DOGM in the amount of $463,711.00 (filed October 29, 1984), payable to the state of Utah, Division of Oil, Gas and Mining and OSM, and the DOGM has received a copy of this permit signed and dated by the permittee.

Sec. 1 STATUTES AND REGULATIONS - This permit is issued pursuant to the Utah Coal Mining and Relamation Act of 1979, Utah Code Annotated (UCA) 40-10-1 et seq, hereafter referred to as UCMRA.

Sec. 2 The permittee is authorized to conduct surface coal mining and reclamation operations on the following described lands (as shown on ownership map) within the permit area at the Trail Mountain Mine situated in the state of Utah, Emery County, and located:

Township 17 South, Range 6 East, Salt Lake Base and Meridian

Sec. 25: Begin at point of SW Corner of NW1/4 SE1/4, thence North 160 Rods, thence East 44 Rods to center Cottonwood Creek, Southward along creek to a point 76 Rods east of the beginning, thence West 76 Rods to the Point of Beginning.

Sec. 25: SW1/4 SE1/4, E1/2 E1/2 SW1/4

Sec. 36: All

This legal description is for the permit boundary (as shown on the permit area map) of the Trail Mountain Mine. The permittee is authorized to conduct surface and reclamation operations connected with mining on the foregoing described property subject to the conditions of the leases, the approved mining plan, and OSM permit UT-0017, to be issued February 1985, including all conditions and all other applicable conditions, laws and regulations.

Sec. 3 This permit is issued for a term of five (5) years commencing on the date the permit is signed by the permittee, except that this permit will terminate if the permittee has not begun the surface coal mining and reclamation operations covered herein within three (3) years of the date of issuance.

Sec. 4 The permit rights may not be transferred, assigned or sold without the approval of the Director, DOGM. Request for transfer, assignment or sale of permit rights must be done in accordance with applicable regulations including but not limited to 30 CFR 740.13(e) and UMC 788.17-.19.

Sec. 5 The permittee shall allow the authorized representative of the DOGM, including but not limited to inspectors, and representatives o the Office of Surface Mining, without advance notice or a search warrant, upon presentation of appropriate credentials, and without delay to:

A. have the rights of entry provided for in 30 CFR 840.12, UMC 840.12, 30 CFR 842.13 and UMC 842.13; and,

B. be accompanied by private persons for the purpose of conducting an inspection in accordance with UMC 842.12 and 30 CFR 842, when the inspection is in response to an alleged violation reported by the private person.

Sec. 6 The permittee shall conduct surface coal mining and reclamation operations only on those lands specifically designated as within the permit area on the maps submitted in the mining plan and permit application and approved for the term of the permit and which are subject to the performance bond.

Sec. 7 Permittee shall take all possible steps to minimize any adverse impact to the environment or public health and safety resulting from noncompliance with any term or conditions of the permit, including, but not limited to:

A. any accelerated or additional monitoring necessary to determine the nature and extent of noncompliance and the results of the noncompliance;

B. immediate implementation of measures necessary to comply; and

C. warning, as soon as possible after learning of such noncompliance, any person whose health and safety is in imminent danger due to the noncompliance.

Sec. 8 The permittee shall dispose of solids, sludge, filter backwash, or pollutants removed in the course of treatment or control of waters or emissions to the air in the manner required by Subchapter K of this Chapter, the regulatory program and which prevents violation of any other applicable state or federal law.

Sec. 9 The permittee shall conduct its operations-

A. In accordance with any measures specified in the permit as necessary to prevent significant, imminent environmental harm to the health or safety of the pbulic; and,

B. Utilizing any methods specified in the permit by the Division in approving alternative methods of compliance with the performance standards of the Act and the regulatory program, in accordance with the provisions of the Act, UMC 786.19(m), and Subchapter K.

Sec. 10 The permittee shall provide the names, addresses and telephone numbers of persons responsible for operations under the permit to whom notices and orders are to be delivered.

Sec. 11 The permittee shall comply with the provisions of the Water Pollution Control Act (33 USC 1151 et seq,) and the Clean Air Act (42 USC 7401 et seq), UCA 26-11-1 et seq, and UCA 26-13-1 et seq.

Sec. 12 Upon expiration, this permit may be renewed for areas within the boundaries of the existing permit in accordance with the Act, the approved Utah State Program and the Federal Lands Program.

Sec. 13 If during the course of mining operations, previously unidentified cultural resources are discovered, the applicant shall ensure that the site(s) is not disturbed and shall notify the state Regulatory Authority (RA). The state RA, after coordination with OSM, shall inform the operator of necessary actions required.

Sec. 14 APPEALS - The lessee shall have the right to appeal: (a) under 30 CFR 775 from actions or decisions of any official of OSM; (b) under 43 CFR 3000.4 from an action or decision of any official of the Bureau of Land Management; (c) under 30 CFR 290 from an action, order or decision of any official of the Minerals Management Service; or (d) under applicable regulations from any action or decision of any other official of the Department of the Interior arising in connection with this permit. In addition, the lessee shall have the right to appeal as provided for under UMC 787.

Sec. 15 SPECIAL CONDITIONS - In addition to the general obligations and of performance set out in the leases, OSM permit UT-0017 and this permit, the permittee shall comply with the special conditions of OSM permit UT-0017 and the conditions appended hereto as Attachment A.

The above conditions (Secs. 1-15) are also imposed upon the permittee's agents and employees. The failure or refusal of any of these persons to comply with these conditions shall be deemed a failure of the permittee to comply with the terms of this permit and the lease. The permittee shall require his agents, contractors and subcontractors involved in activities concerning this permit to include these conditions in the contracts between and among them. These conditions may be revised or amended, in writing, by the mutual consent of the grantor and the permittee at any time to adjust to changed conditions or to correct an oversight. The grantor may amend these conditions at any time without the consent of the permittee in order to make them consistent with any new federal or state statutes and any new regulations.

THE STATE OF UTAH

By: Dianne R. Nielson

Date: February 19, 1985

I certify that I have read and understand the requirements of this permit and any special conditions attached.

Joe Fielder
Authorized Representative of the Permittee

Date: 2/21/85

APPROVED AS TO FORM:

By: Barbara Roberts
Assistant Attorney General

Date: 2-19-85

0132R

ATTACHMENT A

SPECIAL CONDITIONS

Diamond Shamrock Coal Unit
Trail Mountain Mine
ACT/015/009, Emery County, Utah

February 19, 1985

Stipulation 771.23-(1)-MB

1. Within 30 days of permit approval, the applicant will submit two current, complete and comprehensive copies of the Mining and Reclamation Plan for the Trail Mountain Mine to the Division.

Stipulation 817.41-(1)-RS

1. Within 30 days of permit approval, the operator shall provide, for Division approval, a plan for acquiring site-specific borehole data to delineate the occurrence of subsurface water(s) between the mine workings and Mancos Shale. The operator shall commit to acquiring and submitting this information by August 31, 1985.

   If drilling encounters subsurface water(s), the operator shall provide, by August 31, 1985, a systematic monitoring plan for Division approval. The monitoring plan must include:

   A. The type and frequency of field measurements and sampling.

   B. A listing of water quality parameters to be tested and the frequency of laboratory analysis.

   C. A schedule for submitting water level and quality data.

0134R

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF SURFACE MINING

This permit, UT-0017, is issued for the United States of America by the Office of Surface Mining (OSM) to

Trail Mountain Coal Company
Box 370
Orangeville, Utah 84537

for the Trail Mountain mine. Trail Mountain Coal Company is the lessee of Federal coal lease U-082996. The permit is not valid until a performance bond is filed with the OSM in the amount of $463,711.00, payable to the United States of America and the State of Utah, and the OSM has received a copy of this permit signed and dated by the permittee.

Sec. 1 STATUTES AND REGULATIONS - This permit is issued pursuant to the Surface Mining Control and Reclamation Act of 1977, 30 U.S.C. 1201 et seq., hereafter referred to as SMCRA, and the Federal coal leases issued pursuant to the Mineral Leasing Act of February 15, 1920, as amended, 30 U.S.C. 181 et seq., the Federal Coal Leasing Amendments Act of 1976, as amended 30 U.S.C. 201 et seq. and in the case of acquired lands, the Mineral Leasing Act for Acquired Lands of September 7, 1947, as amended, 30 U.S.C. 351 et seq. This permit is also subject to all regulations of the Secretary of the Interior including, but not limited to, 30 CFR Chapter VII, and 43 CFR Part 3400, and to all regulations of the Secretary of Energy promulgated pursuant to Section 302 of the Department of Energy Organization Act of 1977, 42 U.S.C. 7152, which are now in force or, except as expressly limited herein, hereafter in force, and all such regulations are made a part hereof.

Sec. 2 The permittee is authorized to conduct surface coal mining and reclamation operations on Federal lands (as shown on ownership map) as well as on lands with Utah State Permit ACT/015/009 affecting or affected by those operations on Federal lands with the Trail Mountain mine permit area situated in the State of Utah, Emery County, and located:

T. 17 S., R. 6 E., Salt Lake and Baseline Meridian
Sec. 25: Begin at point of SW Corner of NW1/4 SE1/4, thence North 160 Rods, thence East 44 Rods to center Cottonwood Creek, Southward along creek to a point 76 Rods east of the beginning, thence West 76 Rods to the point of beginning.
Sec. 25, SW1/4 SE1/4, E1/2 E1/2 SW1/4.
Sec. 36, All.

This legal description is for the permit boundary (as shown on the permit area map) of the Trail Mountain mine.

The permittee is authorized to conduct surface coal mining and reclamation operations connected with mining on the foregoing described property subject to the conditions of the lease, and the approved mining plan, including all conditions, and all other applicable conditions, laws and regulations.

Sec. 3 This permit is issued for a term of 5 years commencing on the date the permit is signed by the permittee, except that this permit will terminate if the permittee has not begun the underground coal mining activities and reclamation covered herein within 3 years of the date of issuance.

Sec. 4 The permit rights may not be transferred, assigned, or sold without the approval of the Director, OSM. Request for transfer, assignment, or sale of permit rights must be done in accordance with 30 CFR 740.13(e).

Sec. 5 The permittee shall allow the authorized representatives of the Secretary, and the Utah Division of Oil, Gas and Mining (UDOGM), including, but not limited to, inspectors, and fee compliance officers, without advance notice or a search warrant, upon presentation of appropriate credentials, and without delay to:

a. Have the rights of entry provided for in 30 CFR 840.12 and 842.13; and,

b. Be accompanied by private persons for the purpose of conducting an inspection in accordance with 30 CFR 842, when the inspection is in response to an alleged violation reported by the private person.

Sec. 6 The permittee shall conduct surface coal mining and reclamation operations only on those lands specifically designated as within the permit area on the maps submitted in the mining plan and permit application and approved for the term of the permit and which are subject to the performance bond.

Sec. 7 The permittee shall minimize any adverse impact to the environment or public health and safety resulting from noncompliance with any term or condition of this permit, including, but not limited to:

a. Accelerated monitoring to determine the nature and extent of noncompliance and the results of the noncompliance;

b. Immediate implementation of measures necessary to comply; and

c. Warning, as soon as possible after learning of such noncompliance, any person whose health and safety is in imminent danger due to the noncompliance.

Sec. 8 The permittee shall dispose of solids, sludge, filter backwash, or pollutants removed in the course of treatment or control of waters or emissions to the air in the manner required by the approved Utah State Program and the Federal Lands Program which prevents violation of any applicable State or Federal law.

Sec. 9 The lessee shall conduct its operations:

a. In accordance with the terms of the permit to prevent significant, imminent environmental harm to the health and safety of the public; and

b. Utilizing methods specified as conditions of the permit by UDOGM and OSM in approving alternative methods of compliance with the performance standards of the Act, the approved Utah State Program, and the Federal Lands Program.

Sec. 10 The permittee shall provide the names, addresses, and telephone numbers of persons responsible for operations under the permit to whom notices and orders are to be delivered.

Sec. 11 The permittee shall comply with the provisions of the Federal Water Pollution Control Act (33 U.S.C. 1151 et seq.) and the Clean Air Act (42 U.S.C. 7401 et seq.).

Sec. 12 Upon expiration, this permit may be renewed for areas within the boundaries of the existing permit in accordance with the Act, the approved Utah State Program and the Federal Lands Program.

Sec. 13 If during the course of mining operations, previously unidentified cultural resources are discovered, the applicant shall ensure that the site(s) is not disturbed and shall notify the State Regulatory Authority (RA) and OSM. The State RA, after coordination with OSM, shall inform the operator of necessary actions required.

Sec. 14 APPEALS - The lessee shall have the right to appeal: (a) under 30 CFR 775 from actions or decisions of any official of OSM; (b) under 43 CFR 3000.4 from an action or decision of any official of the Bureau of Land Management; (c) under 30 CFR 290 from an action, order, or decision of any official of the Minerals Management Service; or (d) under applicable regulations from any action or decision of any other official of the Department of the Interior arising in connection with this permit.

Sec. 15 SPECIAL CONDITIONS - In addition to the general obligations and of performance set out in the leases, Utah State permit ACT-015-009 (to be issued subsequent to this permit) and this permit, the permittee shall comply with the special conditions of Utah State permit ACT-015-009 and the conditions appended hereto as Attachment A.

These conditions are also imposed upon the permittee's agents and employees. The failure or refusal of any of these persons to comply with these conditions shall be deemed a failure of the permittee to comply with the terms of this permit and the lease. The permittee shall require his agents, contractors, and subcontractors involved in activities concerning this permit to include these conditions in the contracts between and among them. These conditions may be revised or amended, in writing, by the mutual consent of the grantor and the permittee at any time to adjust to changed conditions or to correct an oversight. The grantor may amend these conditions at any time without the consent of the permittee in order to make them consistent with any new Federal or State statutes and any new regulations.

THE UNITED STATES OF AMERICA

By: Richard E. Dawes

12/18/84
Date

I certify that I have read and understand the requirements of this permit and any special conditions attached.

Joseph R. Fielder
Authorized Representative of
the Permittee

12/27/84
Date

Attachment A
Special Conditions

Condition No. 1

The applicant must handle the on-site spoil materials to achieve the following:

A. All materials exceeding electroconductivity values of 16 mmhos/cm shall be placed under a minimum of two feet of less saline suitable topsoil substitute materials.

B. The surface six inches of suitable topsoil substitute material shall not exceed electroconductivity values of eight mmhos/cm.

C. The proposed test plots shall include a revegetation trial incorporating topsoil substitute materials having electroconductivity values approximating these limits. Specifically, the surface six inches shall have a uniform EC value of eight, plus or minus one mmho/cm, and the underlying 18 inches shall have a uniform EC value of 16, plus or minus 2 mmhos/cm.

The applicant shall provide a plan to the regulatory authority within 60 days of permit issuance to sample the regraded surface for the purpose of confirming that the salinity values cited above have not been exceeded.

Condition No. 2

Within 60 days of permit approval the operator shall submit to MSHA a plan for disposal of coal wastes underground as proposed in the permit application, and shall implement the plan upon approval by MSHA. Disposal will take place only in the fee coal areas of the mine.

Condition No. 3

Before any site redisturbance takes place, the applicant must conduct a survey, under supervision of the regulatory authority, of the areas to be redisturbed. The survey shall identify and record locations of individuals and populations of Hedysarum occidentale var. canone (canyon sweet-vetch). If canyon sweet-vetch is found in the portions of the permit area to be redisturbed, the mine operators must develop a mitigation plan for regulatory authority approval before redisturbance takes place.

Attachment A
Special Conditions
(continued)

Condition No. 4

At such time that the Office of Surface Mining, in consultation with the Division of Oil, Gas and Mining and the State Historic Preservation Officer, determines that subsidence within the permit area may adversely affect known or unrecorded cultural sites, additional cultural resources studies may be required. This determination will be based on new subsidence or cultural resource information and clear justification will be presented to the applicant.

Condition Identified by the U.S. Forest Service, Manti-LaSal National Forest (U.S. Forest Service concurrence letter)

During reclamation the applicant must apply seed at 12-18 lbs./acre the first time with lighter applications for spot treatment, especially for broadcast seeding.

TECHNICAL ANALYSIS
FINAL FINDINGS AND SUPPORTING
DOCUMENTATION
TRAIL MOUNTAIN MINE
EMERY COUNTY, UTAH
Revised Copy, November 14, 1984

RECEIVED
JAN 07 1985
DIVISION OF
OIL, GAS & MINING

INTRODUCTION

Trail Mountain Coal Company of Orangeville, Utah, has submitted an underground mining and reclamation permit application for the Trail Mountain complex in Emery County, Utah, to comply with the Coal Mining and Reclamation Permanent Program (Chapter 1) of the State of Utah. This application was originally submitted to the regulatory authority on September 11, 1981. Response to the Apparent Completeness Review was submitted May 31, 1983. The Trail Mountain mine has been operating under a permit issued by UDOGM (ACT-015-009) since May 11, 1978. The MSHA number assigned to the mine is 42-01211.

The Trail Mountain mine has 773 acres of Federal, State, and fee coal within its permit boundary. The mine is located approximately 11 miles northwest of Orangeville, Utah. One Federal coal lease (U-082996) encompasses 80 acres. One State mineral lease (ML-22603) encompasses 640 acres and fee coal land includes approximately 53 acres. The legal description of the mineral ownership is as follows:

Federal Coal Lease U-082996, 80 acres
SW 1/4 SE 1/4, Sec. 25, T17S, R6E, SLB&M
E 1/2 E 1/2 SW 1/4, Sec. 25, T17S, R6E, SLB&M

State Mineral Lease
ML-22603 - 640 acres
Sec. 36, T17S, R6E, SLB&M

Fee Coal Land - 53 acres
Beginning Point SW Corner of NW 1/4 SE 1/4 Sec. 25, T17S, R6E, SLB&M, thence North 160 Rods, thence East 44 Rods to center Cottonwood Creek, Southward along creek to a point 76 Rods east of the beginning, thence west 76 Rods to the point of beginning.

Trail Mountain Coal Company has requested a permit to mine for five years. The estimated life of the mine is five years. Reclamation efforts extend an additional 10 years beyond the life of the mine. The permit area is shown on Figure 3.6 of the permit application.

The permit area is located near the center of the Wasatch Plateau Coal Field, approximately three miles from the mouth of Cottonwood Canyon. The North Fork of Cottonwood Creek forms the northeast boundary of the permit area at the surface facilities area. The topography in the area is rugged, with elevations ranging from 6,800 feet to 9,000 feet above sea level. Slopes within the mine vary from near-vertical cliffs to slopes of less than four percent. The mine portals are located on the west side of Cottonwood Canyon.

The climate in this portion of Utah is characterized by arid to semi-arid conditions. Precipitation varies between 13 and 23 inches per year, depending on elevation. In the vicinity of the mine, mean annual precipitation is estimated to be 17 inches (Utah State University, 1968). The mean average annual air temperature at the Hiawatha weather station, which lies 12 miles to the northeast of the mine (elevation 7,200 feet), is 45°F. Average monthly temperature ranges from 23°F in January to 69°F in July.

The principal soil type found within the disturbed mine area can be characterized as colluvial and alluvial soil developed from outwash brought down the canyon during infrequent floods, and debris from adjacent slopes. It is a deep soil, exceeding five feet and often attaining 10 feet or more. It consists of mostly sands, silts and clays. On the upper mountain slopes of the mine, boundary soils are stony sandy loams. These soils will not be disturbed by the surface facilities.

The vegetation in the permit area contains five distinct vegetation communities, of which all are representative of the steep canyons and mountains of central Utah, and are described as: Riparian, Grassland-Shrub, Pinyon-Juniper, Conifer and Aspen communities. The Grassland-Shrub community is the most extensive vegetation community within the permit area, and is dominated by slender wheatgrass and shadscale.

Coal has been mined on a small scale since 1946. Natomas Coal Company purchased the coal lands described previously from the Fetteroff Group of Somerset Pennsylvania, on March 2, 1981. On September 1, 1983, Trail Mountain Mine and Natomas Coal Company were absorbed by Diamond Shamrock Corporation. Trail Mountain Coal Company, a subsidiary of Diamond Shamrock Coal Unit, now operates the mine and handles all local activities. Land use on and adjacent to the mine plan area consists of recreation, wildlife habitat, and limited livestock grazing. No farming or commercial forest harvesting has occurred within the permit area.

The North Fork of Cottonwood Creek and its associated riparian habitat are considered to be of critical value to the area's wildlife and aquatic resources. No fish species occur in the North Fork of Cottonwood Creek in the vicinity of the mine; however, it is a tributary to Lower Cottonwood Creek, which supports trout and is designated as a Class 3 fishery. Cliffs within and near the permit area represent potentially valuable cliff-nesting habitat for several species of raptors. Wooded areas also provide habitat for the tree-nesting raptors. Mule deer are observed throughout the year within the permit area.

Several springs and seeps have been observed in the area. These occur as a result of recharge from snowmelt in nearby flats along ridges, and then flow horizontally above shale lenses. With no major faults to recharge the lower strata, and underlying glacial drift of highly impervious materials, the resultant ground water is often perched.

The geologic formations exposed on or adjacent to the mine plan area are the Cretaceous age Mesaverde Group, overlain by the Tertiary North Horn and Flagstaff Limestone Formations. The coal reserves are found in the Mesaverde Group. No major faults which extend into the mine plan area have been found. The dip of the strata is generally toward the southwest, ranging from 5 to 11 percent.

Surface water receiving runoff from the permit area include the North Fork of Cottonwood Creek, and Straight Canyon Creek, a tributary of Cottonwood Creek.

Description of Operations

Three portals provide access to the mine. Coal reserves are mined from the Hiawatha seam of the Blackhawk Formation. The sampled coal has low pyritic sulfur content (averaging less than 0.1 percent by weight).

Coal at the Trail Mountain mine is extracted by two continuous miners. Room and pillar mining is the only method of extraction anticipated during the life of the mine (page 3-15, PAP). The mined coal is loaded at the face and transported to a feeder breaker by shuttle cars. Coal is then fed onto a belt that conveys the coal to the tipple. The coal is crushed and stockpiled. In addition, the applicant maintains a 20-acre coal storage yard and loadout facility located one mile northeast of Orangeville, Utah, and 12 miles southeast of the mine. At that location, Trail Mountain Coal Company has added a screening plant to crush and size run of mine coal. The description of these additional coal handling facilities can be found on pages 3-11 through 3-12B of the PAP. Trucks then transport the coal to the Beaver Creek Mining Company's C.V. spur railroad siding, approximately five miles southeast of Price, Utah. The coal is then transferred by the DRG&W Railroad for shipment to customers.

Geologic Setting

The geologic setting of the Trail Mountain mine is discussed in Chapter VI and Appendices 6-1, 6-2, and 7-23 of the permit application. Lithologic logs from the general area, referenced from Davis and Doelling (1977) are presented in Appendix 3-3. A geologic map is presented as Figure 6-4 (PAP). The Trail Mountain mine is located near the center of the Wasatch Plateau Coal Field, 11 miles west of Orangeville, Utah.

Trail Mountain Coal Company (TMCC) has mined and will continue to mine the Hiawatha coal seam, which occurs at the base of the Blackhawk Formation of upper Cretaceous age. Within the permit area, the coal seam ranges from zero to seven feet thick, dipping three degrees to the west-southwest. Depth of cover on the Trail Mountain property ranges from zero to nearly 2,000 feet.

The geologic formations within and adjacent to the permit area are portrayed on Figure 6-2 of the PAP. The lowermost strata of importance is the Masuk

Shale member of the Mancos Formation. Immediately overlying the Mancos is the littoral Star Point Sandstone. The Hiawatha seam of the Blackhawk Formation immediately overlies the Star Point and was deposited in a back-barrier swamp, lagoonal environment. The lower 300 feet of the Blackhawk is the principle coal bearing strata in the region. The Castlegate Sandstone and Price River Formation are the uppermost members of the Mesaverde Group and overlie the Blackhawk Formation within the permit area. The top of the plateau is capped by the North Horn Formation and Flagstaff Limestone of Tertiary age.

The applicant has presented minimal geologic data. Trail Mountain Coal Company presents lithologic logs and a geologic cross section compiled from data collected from the adjacent area. The applicant references Davis and Doelling (1977) as the principal source of geologic data. From this reference and the knowledge derived from forty years of mining, the applicant concludes that there are no significant structures, faulting or folding, within the permit area. Because of the small area covered by the permit (773 acres) and the abundance of data available from previous studies, the applicant's sources of geologic information are considered adequate.

The applicant has collected and analyzed two samples of roof and floor material in order to evaluate the acid-forming potential of the sediments, contiguous to the coal. The acid-base potential of the two samples were +90.2 and +81.6, respectively. On the basis of these data and the low pyritic sulfur content of the roof, floor, and coal samples, 0.20 percent (average) (Table 6-3 and 6-4 of the PAP), the applicant concludes that acid-mine drainage will not be a problem. Water samples collected from within the mine are presented in Table 7-1 of the PAP. Of 16 samples collected, two indicate potential acid-drainage problems. These samples exhibit pH values of 3.2 and 2.6, respectively. The fact that neither dissolved iron, sulfate, nor TDS exhibited elevated concentrations in these two samples, indicates that their pH values represent laboratory errors. Acidic water naturally increases the level of dissolved iron, sulfate and TDS. If these two outliers are rejected, the applicant's conclusion regarding acid drainage can be supported. Continued monitoring, both within the mine and NPDES discharges, should resolve this discrepancy.

Hydrologic Resources

The Trail Mountain permit area comprises approximately 773 acres of land, within the Cottonwood Creek drainage basin. Surface disturbance at the minesite is limited to 8.8 acres and includes the North Fork of Cottonwood Creek, an unnamed side canyon tributary to the North Fork, parking areas, portals, surface facilities and a sediment pond. Surface disturbance at the minesite can be seen on Map C, Appendix 9 of the PAP.

Surface-water quality and quantity data have been collected by the applicant and the USGS since October 1978. The USGS discontinued its gaging station 14060009 in September 1981. The applicant's data are presented in Section 7.2 (Chapter 7) of the PAP. Additional surface-water data are presented in Appendices 7-1, 7-3, 7-10, 7-13.1, 7-16, 7-21, 7-24, and 7-26. Because active mining at the Trail Mountain site commenced in 1946, collection of premining data has not been possible.

The North Fork of Cottonwood Creek enters the mainstream of Cottonwood Creek, three miles below the Trail Mountain minesite. Cottonwood Creek is a tributary to the San Rafael River. Elevations in the general area range from 7,250 feet in the canyon bottoms to 9,200 feet on the ridges and plateaus. The mine portals are located on an east-facing slope between 7,200 and 7,300 feet

elevation. The basin area of the North Fork Cottonwood Creek upstream of the mine is approximately 19 square miles. The drainage is a small perennial stream with a base flow (for the period of record) averaging 0.85 cfs. This baseflow is sustained by spring discharges and ground-water seeps. Most of the mean annual flow (approximately 50 percent) comes in the months of May and June and occurs in response to snowmelt. Mean annual flow in the 1979 water year was approximately 633 acre-feet at the USGS gage 09324200. Figure 7-9 presents the locations of all water monitoring stations.

The surface water of the North Fork can be characterized as a calcium-magnesium bicarbonate-type water. Total dissolved solids vary from 290 to 600 milligrams per liter (mg/L) and vary seasonally with the quantity of flow. From April to June when stream discharges are highest due to snowmelt, a diluting effect usually occurs in surface waters, resulting in a lower total dissolved solids. Total suspended solids concentrations were found to vary from 0.1 mg/L during low flow to 1,318 mg/L during high flow. The waters of the North Fork fit the Utah Division of Health criteria as suitable for domestic use with prior treatment (classification 1C), aquatic life (classification 3A), and agricultural use (classification 4). Water quality data can be found in Tables 7-3, 7-4 and Appendix 7-24 of the PAP.

The majority of springs on Trail Mountain occur in the North Horn Formation, none of which occur on or immediately adjacent to the permit area. The North Horn Formation is composed of variegated shales, sandstones, conglomerates and fresh water limestone. In the Trail Mountain area the North Horn Formation is capped by the Flagstaff Limestone. It is postulated that the Flagstaff Limestone serves as the local recharge area for the North Horn springs. Snowmelt is the principal source of recharge. Average yield of these springs is one to two gpm and varies seasonally. Additional springs and seeps can be found in the Price River, Castlegate and Blackhawk Formations. The limited data collected indicate that these springs may have a lower yield than those in the North Horn Formation. The applicant discusses the hydrogeology of the springs in Section 7.1.5.1 and in Appendix 7-11 of the permit document. The applicant postulates that the springs discharge from a series of interconnected perched aquifers. The presence of impermeable shales within the formation cause the water to move down dip until the surface or another "drain" (i.e. sandy or cobbly strata) is encountered. Unlike other springs in the general area, geologic literature and field investigations indicate that the Trail Mountain springs are not associated with faults or fractures. Water quality data collected from the springs and seeps indicate waters of similar chemical character (calcium-magnesium bicarbonate). Total dissolved solids concentrations range from 254 to 695 mg/L and consistently average 372 mg/L. The waters are generally neutral to slightly alkaline with a pH averaging 7.6. Water quality data are presented on Table 2, Appendix 7-11 of the PAP. Such similarities in water quality indicate that the infiltrating waters are exposed to similar geological, geochemical and residence time conditions. Given the interbedded nature of the overburden sandstones, siltstones and shales, downward leakage and hydrologic communication exist between the various horizons. The springs occur where the more permeable units outcrop at the surface and the difference in hydrostatic head results in discharge.

Little water (eight to ten gpm) is produced within the Trail Mountain mine. Much of this water is used for dust suppression, fire protection and the operation of in-mine machinery. The water encountered, generally drips or seeps from bolt holes and tension cracks, positioned parallel to the working face.

The water sources often dry up as the working face progresses further down dip. Water quality data from intercepted water are presented in Table 7-1 of the PAP. The samples collected exhibit highly variable water quality with pH ranging from 2.60 to 8.60 with most samples averaging 7.80. Total dissolved solids range from 280 to 2,700 mg/L. Because of the paucity of water produced within the mine, 1,100 gpd of Cottonwood Creek water is diverted into the main mine sump for in-mine water usage. The applicant diverts an additional 2,940 gpd (gallons per day) of surface water for use in the bathhouse. The mine discharges water at a rate of 1,800 to 2,400 gpw (gallons per week) to the NPDES permitted sediment pond.

Vegetative Resources

Vegetation information can be found on pages 9-1 through 9-43 (with data on succeeding pages) of the permit application and in deficiency comment responses prepared by Mt. Nebo Scientific Research and Consulting and submitted in December 1983 (Appendix 9).

The permit area contains five distinct vegetation communities which are representative of the steep canyons and mountains of central Utah, and are identified as: Riparian, Grassland-Shrub, Pinyon-Juniper, Conifer, and Aspen communities. Aspen and Conifer communities occupy the higher elevations of north-facing slopes of the permit area. Aspen occurs only as very limited inclusions within other communities. Pinyon-Juniper communities are extensive and occupy steep, rocky slopes with a southern exposure as well as other more xeric sites. The Grassland-Shrub community is intermixed with the Pinyon-Juniper and Conifer communities and extends into the lower elevations of the permit area. The Riparian community occurs only as a narrow band along Cottonwood Creek on the eastern side of the permit area. Of these five communities, only the Grassland-Shrub and Riparian communities were disturbed by mine facilities and construction (which occurred prior to 1977).

The Trail Mountain complex was an active mine when the Surface Mining Control and Reclamation Act was promulgated in 1977, and most disturbances had already occurred. Vegetation data representative of premining communities pursuant to UMC 783.19 (baseline data) was impossible to obtain. Therefore, the applicant sampled portions of the undisturbed communities immediately adjacent to the mine facilities. This vegetation investigation provided the practical information necessary for revegetation seed mixtures and diversity.

The applicant proposes to use reference areas to determine revegetation success. These reference areas have been inspected and approved by the Utah Division of Oil, Gas and Mining (Attachment B, Appendix 9, PAP). A management plan for these areas has been included in the permit application, as well as sampling and testing procedures (UDOGM Guidelines) for determining revegetation success.

The facilities area displaces approximately 8.8 acres of Grassland-Shrub and Riparian vegetation. The remaining three communities are not expected to be disturbed. The floral characteristics of an adjacent Riparian community showed both diversity and complexity. A total of 86 species of plants were encountered during the survey. The overstory exhibited 40 percent cover and was dominated by narrowleaf cottonwood (Populus angustifolia) with an average of 86 mature trees per acre. Saplings and other tree species brought the

total density to 980 stems per acre. Wood's rose (Rosa woodsii) and mountain snowberry (Symphoricarpos oreophilus) exhibited densities of 675 and 540 stems per acre, respectively. Shrubs and tree seedlings and saplings contributed a total of 7.86 percent of total understory cover. Herbaceous cover (27.6 percent of total understory cover) was dominated by aster (Aster chilensis), scouring rush (Equisetum arvense), Kentucky bluegrass (Poa pratensis), and orchard grass (Dactylis glomerata) with 7.77, 6.51, 5.54, and 4.05 percent total understory cover, respectively. Productivity was estimated by the SCS at 2,500 lbs/acre and to be in fair condition.

The Grassland-Shrub community exhibited 37 species of plants including three tree species and six shrub species. Trees accounted for 2.54 percent of total cover (cover is 54.43 percent) and exhibited a density of 405 stems per acre. The shrub stratum exhibited an average cover of 8.50 percent and average density of 4,371 stems per acre. Shadscale (Atriplex confertifolia) dominated the shrub stratum with 4.93 percent cover and 1,153 stems per acre. Utah serviceberry (Amelanchier utahensis), Douglas rabbitbrush (Chrysothamnus viscidiflorus), and broom snakewood (Gutierrezia sarothrae) were subdominants exhibiting 1.24, 1.60, and 0.51 percent cover and 324, 647, and 2,104 stems per acre, respectively. The herbaceous stratum was dominated by slender wheatgrass (Agropyron trachycaulum) with 31.18 percent cover. Productivity was estimated by the SCS at between 900 and 1,000 lbs/acre and was listed as fair condition.

The Pinyon-Juniper community exhibited 62 plant species and was dominated by pinyon pine (Pinus edulis) with 131 out of a total of 233 stems per acre. Shrubs accounted for another 4.11 percent cover and 794 stems per acre with Utah serviceberry predominating. The herbaceous stratum contributed another 15.13 percent cover (12.99 percent grasses) with slender wheatgrass again dominating. Productivity was not estimated.

The Conifer community exhibited 43 species of plants and was dominated by Douglas fir (266 stems per acre) and white fir (156 stems per acre). Total tree density averaged 577 stems per acre while average overstory cover was 60.40 percent. The shrub stratum (3.81 percent cover) was dominated by Utah serviceberry with 2.35 percent cover and 540 stems per acre, and creeping barberry (Berberis repens) with 1.30 percent cover and 8,903 stems per acre. The herbaceous stratum (12.79 percent cover) was again dominated by slender wheatgrass. Productivity was not estimated.

Soils

Soils of the proposed surface facilities site and surrounding area consist of six mapping units. Two of these units are rockland (RoG, RY). The four remaining units are the very stony sandy loam complex (AbG), stony sandy loam complex (CoG), shaley colluvial land (SN), and riparian (R). Of these mapping units, the riparian and stony sandy loam complex are considered representative of the soils which are assumed to have overlain the existing disturbed area (8.8 acres). Soil samples and analyses were conducted on these two mapping units and the results submitted with the original permit application (Chapter 8, PAP).

Soil sampling showed the soil of the riparian mapping unit to be of the Kenilworth Series (Xerollic Camborthid). Horizon textures ranged from sandy loam to sandy clay loam. Electrical conductivity, pH, and sodium adsorption ratios ranged from 0.4 to 3.2, 8.0 to 8.4, and 0.08 to 0.29, respectively. Samples were taken to a depth of five feet at intervals corresponding to soil horizons.

Soil of the stony sandy loam complex is shallow to bedrock. Textures ranged from loam to silty clay loam. Electrical conductivity and sodium adsorption ratios ranged from 0.3 to 0.4 and 0.7 to 0.8, respectively. The pH values were 8.2 to 8.7. Phosphorous and potassium levels were lower for this soil than for that found in the riparian unit. Sample intervals corresponded to horizon thickness.

Due to previous mining operations, little soil exists on the proposed disturbed site. The final graded surface to be used as a seedbed will be composed of cut, fill, and mine-generated spoil materials with some coal wastes included (see UMC 817.103). These materials were sampled in eight locations on the existing disturbed area (pp. 39-44, Appendix 9, PAP). Sampling occurred to a depth of 8 to 12 feet at 2- to 3-foot intervals. Samples were analyzed for phosphorous (ppm), nitrate (ppm), organic matter (percent), electrical conductivity (EC), cation exchange capacity, calcium carbonate (percent), calcium (ppm), magnesium (ppm), sodium (ppm), potassium (ppm), sodium adsorption ratio (SAR), pH, nitrogen (percent), texture, and percent moisture. The following table presents the results of the analysis with regard to the more important soil parameters:

Sample Site	pH Range	EC Range	SAR Range	Texture Range
1	7.6-7.9	4.95-8.20	2.65-4.56	Sandy loam sandy clay loam
2	7.8-8.7	1.85-14.80	3.29-8.47	Sandy loam sandy clay loam
3	7.7-8.2	7.00-18.40	6.25-20.10	Sandy loam clay loam
4	7.6-7.9	8.40-37.00	6.30-36.00	Loam
5	8.2-8.3	11.4-15.7	3.6-6.4	Clay loam
6	8.2-8.7	4.8-7.7	1.4-3.4	Clay loam sandy clay loam
7	7.5-8.0	5.7-10.9	2.6-3.9	Clay loam sandy clay loam
8	7.2-7.6	7.5-11.3	2.4-7.9	Clay loam sandy clay loam

Electrical conductivity (EC) and sodium adsorption ratio (SAR) values are elevated throughout the depth of material sampled, apparently as a result of storage and use of road salt. Mean values for EC in the spoil sample sites range from 6.7 to 22.1 mmhos/cm. The mean EC value is 10.8 mmhos/cm. Excluding the high value (22.1 mmhos/cm.) sample site four reduces the mean spoil value to 9.3 mmhos/cm. Values for SAR's have a median value of 6.25.

Fish and Wildlife Resources

Wildlife resources are described in Chapter X and Appendix 10 of the permit application package.

Terrestrial vertebrate and aquatic invertebrate species inhabiting the mine permit area and vicinity are typical for this region of the Wasatch Plateau. Several game and high-interest terrestrial species inhabit the general vicinity of the permit area. Most, except for mule deer and cliff-nesting species of raptors, are not likely to be exposed to any significant impact from mine operations.

Cliffs within and near the permit area represent potentially valuable cliff-nesting habitat for several species of raptors (e.g. golden eagle, red-tailed hawk, and prairie falcon). Wooded habitat within the permit area also provides nest sites for tree nesting species such as goshawk, Cooper's hawk, sharp-shinned hawk, red-tailed hawk, American kestrel, and screech owl. The bald eagle is a winter visitor in the area. Raptor surveys on the permit area did not locate any nests, and only American kestrel, goshawk, and golden eagle were observed in the area. U.S. Fish and Wildlife helicopter raptor surveys in 1981 and 1982 identified six golden eagle nests (one active in 1981) and one possible prairie falcon eyrie in the general vicinity of the permit area, but all were located at least one-half mile from the mine facilities area.

Mule deer occur within the permit area year-round. During the summer they occupy the mixed mountain shrub and grass-aspen habitats in the mid to upper elevations of the permit area. In the winter, portions of the canyon bottom along the stream and haul and access road is classified by the UDWR as high-priority and critical winter range for mule deer.

No fish species occur in North Cottonwood Creek in the vicinity of the mine; however, the lower portions of Cottonwood Creek, below its confluence with Straight Canyon Creek, does support trout and is designated as a Class 3 fishery. Aquatic macroinvertebrate communities in North Cottonwood Creek above the mine portal are considered healthy and indicative of good stream quality. Below the mine portal area pre-law sediment loading has degraded the quality of stream habitat and reduced the density and diversity of the macroinvertebrate community.

Field investigations and literature reviews have revealed that no threatened or endangered species occur within or near the permit area. The U.S. Fish and Wildlife Service has confirmed this in a letter dated October 21, 1983 (Attachment C).

Land Use

Land use is discussed in Chapter IV of the permit application package.

The Trail Mountain Coal Company owns approximately 53 acres of private land for operation of the Trail Mountain mine. The majority of the remaining land in the area is part of the Manti-LaSal National Forest. Mineral ownership within the permit area consists of Federal and fee coal. The Trail Mountain mine is the only operating mine in the North Cottonwood Creek drainage. No oil or gas wells have been drilled on or adjacent to the permit area; one State and one Federal oil and gas lease are held within the permit area (pages 4-5 and 4-6 of the PAP). The applicant has contacted the oil and gas lessees to coordinate any future development of resources under the multiple minerals management program.

Premining and existing land use on and adjacent to the mine plan area consists of mining, recreation, wildlife habitat, and limited livestock grazing. Coal mining in Cottonwood Canyon has occurred since 1909. The Johnson mines (approximately 1.2 miles downstream from the Trail Mountain mine) were active from 1909 to 1948, while the Cottonwood Canyon prospects were active from 1946 to 1948. An estimated 96,000 tons of coal have been removed from the Hiawatha seam by the earlier mines. Production of the earlier mines was by room and pillar mining.

Recreational use of the area occurs primarily as sightseeing by people traveling up the road in Cottonwood Canyon to access the upper plateau areas above the mine. There is no fishing in the canyon in the vicinity of the mine, although some hunting occurs on the plateau above the mine.

No farming or commercial forest harvesting has occurred within the permit area. Steep, rocky terrain and poor soils preclude farming in the area. The predominance of rugged terrain and rocky cliffs also limits livestock grazing.

REGULATORY ANALYSES BY TOPIC

I. TOPSOIL

1.1 Existing Environment and Applicant's Proposal

Soil Baseline Data

Soil information for the mine permit area was presented in Chapter VIII of the original permit application in 1981. Information consists of a brief description of the soils overlying the permit area based on Soil Conservation Service mapping. Soils which were assumed to overlie the present disturbed area were evaluated in more detail. Pits were dug in the Riparian and Grassland-Shrub vegetative communities and the soils described and sampled. The normal suite of parameters was analyzed for each sample. In 1983, a sampling program was initiated to characterize fill material (Appendix 9, pp. 15-17, 39-44). Eight spoil pits were dug at various locations on the minesite. Samples were taken at two- to three-foot intervals to depths from eight to thirteen feet. Samples were analyzed for phosphorous (ppm), nitrate (ppm), organic matter (percent), electrical conductivity (EC) (millimohs per cm), calcium (ppm), magnesium (ppm), sodium (ppm), potassium (ppm), sodium adsorption ratio (SAR), pH, nitrogen (percent), texture, and percent moisture, and are discussed above. A total of 75 samples were analyzed (29 soil and 46 spoil).

Analyses provided by the applicant indicate a range of salinity values for native soils in the vicinity of the minesite, measured as EC, from 0.4 to 9.8 millimohs per cm (mmhos/cm). Surface horizon samples are less than three mmhos/cm. Recently disturbed soil materials at points topographically and stratigraphically below the mine site range in EC from 2.6 to 9.8 mmhos/cm, and average 7.6 mmhos/cm.

Spoil material EC values on the site range in value from 1.9 to 3.7 mmhos/cm. The average EC value for such materialls is 10.2 mmhos/cm.

Soil Suitability and Handling

The area to be included in the surface facilities area (8.8 acres) during the permit term was disturbed during the past mining operations and will be disturbed again during reclamation operations. No additional acreage will be disturbed during the life of the mine. No soil material, with the exception of those on the borrow area site, were salvaged during initial disturbance. Existing cut-and-fill material will constitute the majority of seedbed material. With the exceptions of some high EC and SAR materials, the applicant considers this material to be suitable as a growth medium (see UMC 817.103 discussion on page 37 of this document).

After the conclusion of mining, surface facilities will be removed, the sewer system will be sealed, trash and debris will be hauled away to the Emery County landfill, and the concrete foundations and gravel road base will be buried. Cut-and-fill materials will be graded to create a slope (25 to 30 degrees, Appendix 9, p. 7) extending from Cottonwood Creek to the western extent of the disturbed area. During grading, cut-and-fill materials unsuitable as growth medium will be buried under at least four feet of fill (Appendix 9, pp. 16 through 17B). Following culvert extraction, the drainageway will be re-established and fill materials graded from embankments.

A trench will be cut at the top of the slope to divert the overland flow of water from passing over the graded spoil. These contour trenches will be cut into the graded slope to further reduce erosion potential. Erosion control mats will also be added to the slopes to protect the surface reclaimed area.

Fertilizer materials will be added to the seedbed as per the results of analysis conducted on spoil samples taken after grading. During reclamation of the Riparian community, discing and harrowing will be used to incorporate fertilizer into the seedbed. The applicant has stated that land imprinting will serve to incorporate fertilizer in the Grassland-Shrub community.

The small amount of topsoil salvaged in conjunction with borrow area construction will be replaced on the regraded site. Revegetation will then be completed as described in Appendix 9.

1.2 Evaluation of Compliance

UMC 817.21 Topsoil: General Requirements

The applicant has complied with the requirements of this section.

UMC 817.22 Topsoil: Removal

The applicant will, in effect, be using substitute topsoil materials. This activity is required since no topsoil was salvaged, with the exception of that overlying the borrow area, during previous mining activities. Chemical analyses conducted on fill material at the surface facilities area show some potential for high SAR and EC levels. An analysis of the data and backfilling and grading plan provided by the applicant indicates that there is a significant probability that the uncontrolled placement of spoil material could result in unsuitable saline material being placed in the plant rooting zone, and that salt concentrations in the surface seed bed material could inhibit seed germination and seedling establishment. The applicant will be in compliance upon acceptance of the permit condition, below, requiring selective removal and placement below two feet of suitable plant growth materials, all spoil material which exceeds an EC value of 16 mmhos/cm.

UMC 817.23 Topsoil: Storage

The applicant has complied with the requirements of this section.

UMC 817.24 Topsoil: Redistribution

Because no soil was saved during previous operations, with the exception of the borrow area, little soil exists for redistribution. The applicant has proposed to use topsoil substitute material consisting of cut-and-fill materials, but has not specified any methodology to assure that unsuitable saline materials will not be placed in the regraded material which will provide the rooting zone. The applicant will be in compliance upon acceptance of the permit condition below, which restricts the redistribution of saline materials.

The salinity of topsoil substitute materials placed in the upper six inches will be no greater than eight mmhos/cm, and the material in the six to twenty-four inch zone will not exceed 16 mmhos/cm. The applicant shall include in the proposed test plots a trial including materials approximating these limits. The applicant may include other trials which exceed these limits, if so desired, to demonstrate the feasibility of reclamation success using more saline materials.

UMC 817.25 Topsoil: Nutrients and Soil Amendments

During reclamation of the Riparian area, applied fertilizer will be incorporated into the soil by discing and harrowing in the Riparian community. With respect to the Grassland-Shrub community, incorporation will be achieved to the degree possible through land imprinting. Imprinting will disturb the soil to a depth of six to eight inches providing a reasonable degree of incorporation. Steep slopes together with precipitation which would wash away the fertilizer prevent other incorporation techniques from being applied. A small amount of fertilizer likely will be lost to erosion. The applicant is in compliance with this section.

1.3 Conditions

The applicant must handle the on-site spoil materials to achieve the following:

A. All materials exceeding electroconductivity values of 16 mmhos/cm shall be placed under a minimum of two feet of less saline suitable topsoil substitute materials.

B. The surface six inches of suitable topsoil substitute material shall not exceed electroconductivity values of eight mmhos/cm.

C. The proposed test plots shall include a revegetation trial incorporating topsoil substitute materials having electroconductivity values approximating these limits. Specifically, the surface six inches shall have a uniform EC value of eight, plus or minus one mmho/cm, and the underlying 18 inches shall have a uniform EC value of 16, plus or minus 2 mmhos/cm.

The applicant shall provide a plan to the regulatory authority within 60 days of permit issuance to sample the regraded surface for the purpose of confirming that the salinity values cited above have not been exceeded.

II. HYDROLOGIC BALANCE - SURFACE WATER

2.1 Existing Environment and Applicant's Proposal

Surface disturbance at the Trail Mountain mine is confined to 8.8 acres on and near the floor of the canyon. The applicant proposes no further surface disturbance over the life of the mine. The location and nature of the disturbance is portrayed on Map C, Appendix 9 of the PAP. In order to construct the facilities area in the narrow, confined Cottonwood Creek Canyon, Trail Mountain Coal Company diverted the stream channel through a 66-inch culvert (Appendix 7-1). North of the mine office the applicant borrowed material to backfill over the existing channel and culvert and constructed the surface facilities. Additional contouring and leveling in and around the facilities accounts for the remaining surficial disturbance.

Diversion ditches and sedimentation ponds are used at the facilities site to protect the surface-water hydrologic balance. The applicant proposes to continue the use of the existing facilities for the remainder of the mining operation (five years).

The sediment control plan is discussed in Appendix 7 (7-1 through 7-6, 7-20, and 7-27) and Section 3.2.8 of the PAP. Three water diversion structures are maintained at the Trail Mountain mine. A berm and a half round culvert run north-south through the property and divert water from the disturbed area to the sediment pond. A 66-inch culvert is used to divert the North Fork of Cottonwood Creek around and below the Trail Mountain mining operation. A 48-inch culvert, located at the mouth of the tributary canyon, west of the main portal, diverts undisturbed runoff directly into the 66-inch culvert of Cottonwood Creek. Drainage control is presented in Appendix 7-1 of the PAP. Design details and design parameters for the diversion structures are presented in Section 7.2 and Appendix 7 of the PAP. One sediment pond, located south of the disturbed area, controls the sediment and water from a 10-year 24-hour storm over the disturbed area. Designs and design parameters for the sediment pond are located in Section 7.2.4.2 and Appendix 7 of the permit application.

Reclamation at the Trail Mountain site will consist of construction of sideslope sediment control and diversion trenches, and removal of the sediment pond, diversion structures and all surface facilities. The disturbed surface will be recontoured and graded to slopes approaching 25 to 30 degrees. The surface layer of the soil will be manipulated to enhance vegetation re-establishment and reseeded. Following reshaping, compacting and contouring of the slopes, the applicant proposes to restore the original drainage system

following removal of the culverts. The side canyon tributary near the mine entrance portal (Map C, Appendix 9 of the PAP) will be re-established. Large rocks (median diameter, 0.8 feet) will be placed in the drainage to establish riprapped banks. Riprap designs are presented in Appendix 7-27 of the PAP. The reclaimed slope will be temporarily protected by a contour trench 15 inches deep, 48 inches wide, which will divert runoff from the undisturbed slopes to the newly established east-flowing tributary. This trench is located immediately above the reclaimed slope.

Eighteen hundred feet of culvert will be removed from the North Fork of Cottonwood Creek and the original drainage channel will be re-established upon bedrock. The applicant intends to re-establish the natural contours of the stream and stream banks to the maximum extent possible. Rock riprap (median diameter, 1.4 feet) will be placed along the channel banks to ensure channel stability. Channel hydraulics for the restored channel (100-year event) are presented in Appendix 7-27. The North Fork channel will be designed as a trapezoidal channel with 2:1 side slopes. Riprap will be placed along the side slopes sufficient to contain a flow depth of four feet. The channel will be entrenched on pre-existing bedrock. Large boulders, serving as rock check dams and aquatic habitat, will be placed on the floor of the channel intermittently along the reclaimed reach. The applicant proposes to plant seed below the riprap filter along the banks of the reclaimed channel to promote riparian habitat. Reclaimed and premining channel cross sections are presented in the permit application (Appendix 9, Attachment C of the PAP).

The applicant proposes a variety of measures to reduce erosion along the reclaimed hillslopes. These are discussed in Appendix 9 of the PAP (pp. 7-13 and Attachments 12). The first phase of the erosion control measures utilizes a crawler dozer with an attached broadcast seeder, which will pull a land imprinter. The land imprinter will partially compact the topsoil layer, creating polygonal indentations about six to eight inches deep and will break up the large cloddy material developed from compaction of the mining activities. The patterns will parallel the contour, if possible, thus decreasing erosion, increasing infiltration and slightly covering the seed.

In addition, the applicant proposes four, approximately 1,950-foot long contour trenches between 42 and 48 inches wide and between 15 and 18 inches high. The uppermost trench, described on the previous page, will be 48 by 15 inches (w x d) and will redirect surface runoff originating above the disturbed area to the east-flowing tributary. The second, third, and fourth trench (42 by 18 inches) will be spaced 60 feet apart (downslope) and will be designed to temporarily contain water and sediment. These trenches are expected to minimize sedimentation from the reclaimed slope to Cottonwood Creek until vegetation is successfully re-established.

The applicant also proposes to protect the entire reclaimed surface area with erosion control mats. The erosion control mat is available in five-foot by 100-foot blankets of interlocking curled wood fibers held by plastic netting. The mats will be anchored to the seedbed by two-foot aluminum staples. Such matting is intended to decrease slope erosion and increase available soil moisture to enhance the establishment of vegetation.

Coal waste piles stored near the tipple (see Map C, Appendix 9) will be deposited in the underground mine. Initially the water within the sediment pond will be allowed to evaporate. The remaining sediments will be removed from the sediment pond and hauled underground in a manner similar to the coal waste products. The applicant will remove and set aside the riprap, and regrade the sediment pond to a smooth land surface configuration. The riprap will then be used for streambank reclamation. Final land surface contours are presented on Map D, Appendix 9 of the PAP. During construction activities to re-establish the stream channel, control of sediment produced by construction is not possible because construction will take place directly in the stream channel. Therefore, construction to reclaim the stream channel will take place during the low-flow months of September through November to minimize the temporary sediment transport.

The applicant presents a water monitoring map on Figure 7-9 of the permit application. A surface-water monitoring plan is presented in Section 3.4.3.6, Section 7.2.7 and Appendix 7-16 of the PAP. Data are presented on Tables 7-3, 7-4, and Appendices 7-10 and 7-24 of the PAP. Trail Mountain Coal Company currently monitors runoff at three permanent locations on the North Fork of Cottonwood Creek: SW-1, SW-2, and SW-3. The three stations along Cottonwood Creek are situated above (SW-1), below (SW-3) and within (SW-2) the disturbed area. Water quantity and quality data will be collected from perennial streams on a bimonthly basis. Once the applicant has collected sufficient data, all surface-water monitoring sites will be monitored quarterly for flow and water quality. The applicant proposes to report these data on a quarterly basis.

Following the cessation of mining the applicant proposes to monitor "representative" surface-water stations for water quantity and quality on a biannual basis (during high and low flows). Such sites will be selected after consultation with the regulatory authority. Water quality parameters to be monitored are listed on Table 7-2 of the PAP.

In addition to the applicant's monitoring program, the U.S. Geological Survey collected three years of water quantity and quality data on Cottonwood Creek (station 09324200), immediately downstream of the disturbed area. The data for this station are presented in Appendix 7-24 of the PAP.

Trail Mountain Coal Company has been issued an NPDES permit (UT-0023728) for its sedimentation pond (Attachment 7B, Chapter 7, PAP). All runoff from the facilities area are controlled by the sediment pond. The applicant notes that effluent limitation for total suspended solids (TSS), total iron, total dissolved solids (TDS), oil and grease and pH must be met to maintain compliance with the NPDES permit. Discharges from the sediment pond at the Trail Mountain mine will be monitored on an event-by-event basis. These NPDES reports will be filed quarterly.

2.2 Evaluation of Compliance

UMC 817.43 Hydrologic Balance: Diversion and Conveyance of Overland Flow, Shallow Ground-water Flow, and Ephemeral Streams

The Cottonwood Creek diversion system, a 66-inch culvert, has been designed by the applicant to pass the 50-year, 24-hour runoff event. This design event is larger than that required by the regulations, but was used based on recommendations of the U.S. Forest Service. The side canyon diversion culvert has been designed to pass the 10-year, 24-hour storm event. The half round diversion culvert, which collects runoff from the disturbed area, was designed to pass runoff from a 10-year, 24-hour storm event. The peak flows for the 10-year, 24-hour and 50-year, 24-hour events were determined using the unit hydrograph procedure developed by the U.S. Soil Conservation Service (1972) and is described by the applicant on pages 7-27 through 7-33 of the PAP. Values for peak flows are presented on Table 7-7 and Appendix 7-27 of the PAP. The applicant uses a curve number (CN) of 57 to describe the runoff characteristics of the Cottonwood Creek watershed upstream of the mine. On the basis of this and the remaining parameters (Table 7-7), the applicant calculates a design flow of 510 cfs (50-year, 24-hour storm event). Such a value concurs with the estimate provided by the U.S. Forest Service (450 cfs) (letter from D. G. Chadwick to Wayne Hedberg, October 9, 1981, Appendix 7-27 of the PAP). The applicant has provided no supporting documentation (soil survey, land-use characteristics, etc.) to substantiate this low curve number. If a higher curve number were used (i.e. CN = 70), the volume of flow would double and peak flow values would increase substantially. However, the applicant has designed the diversion facilities to exceed the requirements of the law (10-year, 24-hour storm event). Although there is disagreement on the curve number selected, design capacity of the existing diversions satisfy the requirements of the law (see UMC 817.44). All other parameters cited in Table 7-7 are reasonable. The applicant's 50 year design, with a questionable curve number of 57, will be more than adequate for the required 10-year, 24-hour storm event capacity.

Hydraulic design for the diversion and collection system was accomplished by the applicant utilizing standard open-channel and pipe flow methodologies. Culvert capacity for the side canyon diversion is determined to be adequate. Because of the use of corrugated steel culvert, channel stability is provided throughout the diversion structure. The applicant constructed riprap at the entrance of the side canyon culvert and the entrance and exit of the Cottonwood Creek culvert. The applicant discusses this on page 7-25 and in Appendix 7-27 of the PAP. Further discussion of riprap design and compliance can be found in Section UMC 817.44 of this document.

The disturbed runoff collection system proposed by the applicant incorporates the use of a 15-inch half round culvert and associated berm. A cross section of the system is presented as Figure 7-12 of the PAP. Design criteria are presented in Table 7-8 of the PAP. The collection system, as designed, provides adequate capacity to convey the 10-year, 24-hour runoff event. The highest flow velocities (11.60 fps) will occur in the corrugated culvert section of the diversion. The maximum overbank velocity will approach 5.47 fps. The applicant has presented the necessary riprap sizes to accommodate predicted velocities. The hydraulic design for the collection system, as presented in the permit application, ensures hydraulic stability.

In accordance with this regulation, the applicant intends to remove all diversions upon completion of mining activities. Additionally the applicant diverts water from the surface drainage system to its underground mine in accordance with subsection (g) of this statute. Further discussion to this effect can be found in Section UMC 817.55 of this document. At the end of mining, the side canyon tributary diversion culvert will be removed and the disturbed section of this ephemeral channel will be reconstructed in its original configuration (Appendix 7-27, PAP). The channel will be reconstructed as a trapezoidal channel (two-foot bottom width), and will be incised onto pre-existing bedrock, with riprapped 2:1 side slopes. Eight inches of riprapped freeboard will provide additional protection for the 100-year, 24-hour event. The reconstructed side canyon tributary meets the requirements of the law.

With respect to this section of the regulations, the applicant is in compliance.

UMC 817.44 Hydrologic Balance: Stream Channel Diversions

The "undisturbed" runoff diversion system of the North Fork of Cottonwood Creek has been designed by the applicant to pass the 50-year, 24-hour runoff event. This event is larger than that required by the regulations, but was used based on recommendations of the U.S. Forest Service. The peak flows for the design event were determined using the unit hydrograph procedure developed by the U.S. Soil Conservation Service (1972). Culvert capacity, as presented by the applicant, is adequate and satisfies the requirements of UMC 817.44. Because peak flow velocities are through a corrugated steel culvert, hydraulic design of the diversion is satisfactory.

The applicant has presented sufficient information with respect to the riprap structures/energy dissipators at the entrance and mouth of the diversion to assess compliance with UMC 817.44(b)(1). An analysis of the data presented by the applicant indicate that the riprap at the exit structure will reduce the velocities of flow passing through the culverts. At peak flow, velocities exiting the energy dissipator structure will approach nine fps. Some erosion of the receiving channel will take place under such velocities. It is likely that similar erosion would have taken place under natural conditions. Some movement of the riprap at the pipe-flow exit (velocities 25 fps) will take place under 50-year storm conditions. Riprap structures are in place and the applicant proposes continual monitoring and maintenance. The applicant's visual monitoring program and maintenance procedures will mitigate any failure of the riprap. The diversion system and energy dissipators, as presented in the application, are adequate.

Upon completion of mining activities, all diversions will be removed. The applicant intends to restore the original drainage configuration throughout the permit area. Design specifications and hydraulic calculations for the reconstructed stream channels are presented in the application (Appendix 7-27). The applicant proposes to reconstruct the North Fork as a trapezoidal channel (seven-foot bottom, 2.0:1 side slopes) with riprapped banks. The channel will be entrenched onto pre-existing bedrock. Channel cross sections are presented in Attachment C, pages 51 through 53, Appendix 9 of the permit application package. The applicant estimates that the 100-year storm will

reach a 3.8-foot depth of flow through the reconstructed channel reach (Appendix 7-27). This estimate is based on a roughness coefficient of 0.05 and a channel slope of six percent. The applicant proposes to extend riprap (D50 = 1.4 feet) four and a half feet high along the North Fork Cottonwood Creek side slopes. Such a design will be sufficient to withstand the erosive effects of the 100-year storm event with additional freeboard. The reconstructed stream channel is designed in accordance with the natural (undisturbed) channel immediately upstream and downstream. Its similar channel geometry and bed roughness characteristics will enhance its long-term stability. The presence of large boulders, placed intermittently along its bottom will improve aquatic habitat and enhance the riparian characteristics of the reconstructed North Fork Cottonwood Creek stream channel. The proposed reclaimed channel design of the North Fork Cottonwood Creek, referenced in Appendix 7-27 of the PAP, is acceptable.

The applicant's permanent diversion designs comply with the requirement of this section.

UMC 817.45, 817.46 Hydrologic Balance: Sediment Control Measures and Sedimentation Ponds

During the life of the mine the applicant uses a sedimentation pond to control and treat the runoff from the disturbed area. Data and design details of the sedimentation pond are presented on page 7-57 of the PAP. The sedimentation pond is designed to control the inflow volume of a 10-year, 24-hour storm. In addition, it is designed to contain sediment storage volume from 0.05 acre-feet of sediment per acre of disturbed area. The applicant commits to cleaning out sediment at 60 percent of the sediment storage level. Spillway capacity requirements for the sedimentation pond were based on runoff from the 25-year, 24-hour storm. The applicant presents the assumptions on which this analysis is based. The applicant's design meets the requirements of this section.

At the end of mining the sedimentation pond will be cleaned out and reclaimed. The applicant proposes to haul the accumulated sediment to the underground mine (page 6, Appendix 9 of the PAP). Riprap salvaged from the sedimentation pond will be used in the stream channel reconstruction.

The sedimentation control practices utilized during the course of mining are adequate as designed.

The method of contour ditching and surface manipulation during reclamation provides an adequate method for controlling erosion from the fill section at the Trail Mountain minesite. Periodic maintenance of these structures will be necessary. The design of these trenches must provide containment capacity for the 10-year design event and associated sediment accumulation until revegetation reclamation on the disturbed area is established. It should be noted that following removal of the 66-inch culvert, there will be no sedimentation control along the North Fork of the Cottonwood Creek. During construction activities to re-establish the stream channel, control of sediment produced by construction is not possible because construction will take place directly in the stream channel. No practical technology is available to control sediment for this reclamation step. Therefore,

construction to reclaim the stream channel will take place during the low-flow months of September through November to minimize the temporary sediment transport. The probable hydrologic consequences of this action are discussed in Chapter IV.

The applicant presents design criteria and calculations for the erosion-control trenches in Attachment 12 and Map D, Appendix 9. Review of the calculations indicates that the design will satisfactorily control runoff from the 10-year, 24-hour precipitation event and ten years of sediment accumulation. The applicant proposes to use the uppermost trench (Trench 1) to collect and divert all runoff and sediment from the undisturbed slope. Design specifications describe a diversion trench 1,950 feet long, with a one percent slope. Calculations (Attachment 12) indicates that such a trench will be hydraulically stable under 10-year, 24-hour storm event conditions. The lower three trenches are described in Attachment 12 as 1,950 feet long, 3.5 feet wide, and 1.5 feet high. As designed, these trenches will contain the runoff for a 10-year, 24-hour storm event and ten year's accumulation of sediment.

The applicant's sediment control measures comply with the requirements of this section.

UMC 817.52(b) Hydrologic Balance: Surface-Water Monitoring

The applicant measures surface flows and water quality within the permit boundary. Surface-water monitoring data, collected by both the applicant and the USGS, are presented in the permit document.

The applicant has proposed an operational monitoring program, which includes quarterly monitoring of flow and water quality at three surface-water stations. Data will be submitted to the regulatory authority quarterly, with an annual summary.

The applicant presents a post mining surface-water monitoring program, which includes representative surface-water monitoring stations. Frequency, monitoring parameters, and the locations of gage sites will be determined upon consultation with the regulatory authority.

Given the concerns with the stability of the riprap structures both during and following mining, the applicant engages in a visual inspection program of the riprap designed to protect the receiving waters from water quality degradation. The applicant satisfactorily meets the requirements of this statute.

UMC 817.55 Hydrologic Balance: Discharge of Water into an Underground Mine

The applicant has discharged and will continue to discharge an average of 1,100 gpd of Cottonwood Creek water into the main mine sump for in-mine water usage. In addition, the applicant diverts 2,940 gpd to the bathhouse. All water discharged from the mine is treated at the sedimentation pond prior to NPDES releases to the surface-water system.

The applicant has applied for and received approval for diverting 17.6 acre-feet of water per year (15,711 gpd) from Cottonwood Creek for industrial purposes (Appendix 7-8, 7-9 of the PAP). Approval by the State Engineer was obtained on August 26, 1983. All underground discharges are controlled and are ultimately treated by an existing facility. MSHA approval for these discharges is presented in Appendix 7-18 of the PAP.

The applicant's plan to discharge water to the underground mine meets the applicable requirements of this section.

UMC 817.56 Hydrologic Balance: Post Mining Rehabilitation of Sedimentation Ponds, Impoundments and Treatment Facilities

Rehabilitation of all temporary diversions and sedimentation ponds at the Trail Mountain mine has been addressed adequately by the applicant in Appendix 9 of the PAP.

UMC 817.57 Hydrologic Balance: Stream Buffer Zones

The initial disturbance to the North Fork of Cottonwood Creek predated the passage of SMCRA (August 1977). Although the North Fork of Cottonwood Creek contains a biological community as described in Paragraph (c) of this section, the regulations of this section do not pertain to the disturbance of the channel, as diverted through the 66-inch culvert.

The applicant has received a variance from the 100-foot buffer zone criteria on previously undisturbed areas of Cottonwood Creek, upstream and downstream of the culvert (Appendix 7-12 of the PAP). This variance is implied in the applicant's approval for main channel culvert extension granted by the Utah Division of Oil, Gas and Mining on May 26, 1983 (Appendix 7-4 of the PAP). A 50-foot buffer zone will be maintained by the applicant. Because of the narrow canyon configuration at the site, a 100-foot buffer zone is not practical. The buffer zone incorporated at the Trail Mountain mine plan is 50 feet wide, 50 feet upstream and 50 feet downstream of the culvert disturbances.

A tributary to the North Fork of Cottonwood Creek crosses the permit area just north of the portal area. This tributary is ephemeral and does not qualify for protection under buffer zone requirements.

The application meets the requirements of this section.

2.3 Conditions

None.

III. HYDROLOGIC BALANCE - GROUND WATER

3.1 Existing Environment and Applicant's Proposal

The applicant proposes to monitor the quantity and quality of ground water at locations of springflow near the Trail Mountain permit area and at in-mine locations when encountered. Permanent ground water monitoring stations are presented on Figure 7-9 of the PAP. Because the mine produces little ground water, surface water must be brought into the mine for equipment needs and dust suppression. Water discharged from the mine to the NPDES pond is a mixture of both surface and ground water.

Trail Mountain Coal Company initiated an in-mine ground-water sampling program in 1979. Only one site, UG-1, is a long-term water producer. Flow rate at this site as reported in Appendix 7-11, was measured to be 1.7x10-4 cfs (0.08 gpm) on November 16, 1983. The applicant has committed to monitor this site monthly as flow permits and any other underground water-producing zones, when encountered (Section 7.1.7 and Appendix 7-13.1 of the PAP). The applicant committed to reporting hydrologic monitoring results quarterly and summarizing data annually (Appendix 7-13.1, PAP).

A spring inventory was conducted in June 1981. Six springs or seeps and four stock ponds sustained by ground water were identified in this inventory. None of these sources are on or immediately adjacent to the permit area. The locations and pertinent water quality data are presented in Figure 7-2 of the PAP. Water quality data collected by the applicant and by the U.S. Geological Survey are presented in Appendix 7-11 of the PAP. The applicant has committed to monitoring springflow biannually and water quality quarterly. The applicant has collected and presented minimal stratigraphic data on the lateral extent of the aquifers present on Trail Mountain. Geologic data compiled by the applicant from regional sources are presented in Chapter 6 and Appendix 3-3 of the PAP. Regional spring and well data are presented in Appendix 7-11 of the PAP.

The hydrogeologic system of Trail Mountain is described by the applicant in Section 7.1.3 of the PAP, as consisting of perched aquifers fed by local recharge sources. The majority of these perched aquifers can be found in the North Horn, Price River, and the Blackhawk Formation. In the immediate vicinity of the mine the majority of the springs were found on the west face of Trail Mountain and emanated from the North Horn Formation. In a regional inventory of the Trail Mountain area conducted by the USGS, 30 of 54 springs were located in the North Horn Formation. Sixteen springs were located in the Price River Formation and four each were located in the Castlegate and Blackhawk Formation (Appendix 7-11 of the PAP). The applicant states that the springs are recharged by snowmelt, derived from offsite plateaus which are capped by the Flagstaff Limestone and/or the North Horn Formation. The infiltrating water flows locally down the stratigraphic section until an impermeable horizon is encountered; whereupon, the infiltrating waters move down dip (west) until the topographic surface or another "drain" within the formation is encountered. The majority of the ground water recharge-discharge occur in strata significantly higher than the coal seam which is mined at the Trail Mountain site.

The hydrogeologic and geochemical data provided by the applicant in Section 7.1.3, Appendix 7-11, and Figure 7-2, indicate that considerable mixing and vertical leakage occur in the overlying sediments. One can assume that hydrologic communication takes place between adjacent strata and formations. The presence of a small number of springs (Figure 7-2, PAP) on the east side of Trail Mountain and the one spring (TM 23-1) in the Blackhawk Formation indicate that hydraulic head differential superimposed upon geologic structure may be the controlling mechanism for the ground water gradient.

Ground-water inflow to the Trail Mountain mine is limited (8-10 gpm). The applicant describes the source of mine-water inflow in Section 6.7 and Figure 6-8 of the PAP. The applicant hypothesizes that as mining progresses, mine entries intersect joints or fractures hydrologically connected to saturated sandstone lenses or paleochannel aquifers. In some cases in-mine drill holes or roof bolts directly intersect saturated horizons and produce a limited amount of ground-water inflow. The applicant describes only one long-term water-producing horizon (UG-1) (page 7-21A of the PAP).

3.2 Evaluation of Compliance

UMC 817.48 Hydrologic Balance: Acid-forming and Toxic Material

At the end of mining the applicant proposes to dispose of the coal waste piles which are stored near the tipple in the underground mine.

The applicant has analyzed one sample from the unmined coal seam (Table 6-4 on page 6-14A of the PAP) and concluded that the Hiawatha seam contains low values of pyritic sulfur. Adjacent area mines and the general literature confirm these conclusions. In addition the applicant has collected and analyzed two samples of roof and floor material in order to evaluate the acid-forming potential of the sediments contiguous to the coal. On the basis of the acid-base potential analysis and the low pyritic sulfur content of the samples, the applicant concludes that acid drainage will not be a problem. Data from adjacent mines (Wilberg mine, 130 samples) indicate that the majority of samples are non-toxic and non-acid-forming.

Although there are indications that the coal waste pile samples may be toxic and acid-forming, the applicant's proposal to bury this material in the underground mine is acceptable. Historical data on mine water inflow indicate that the Trail Mountain mine is a relatively "dry" mine. By "backstowing" unusable or contaminated coal into mined-out areas during (Appendix 3-2) and following mining (Appendix 9), these materials will be isolated from the ground- and surface-water systems.

The applicant discusses temporary storage of coal waste materials, near the tipple on page 3-6. All runoff from the surface facilities area is controlled by the sediment pond. Based on effluent limitations (NPDES permit) neither oil and grease nor acid-forming and toxic material will be discharged to the surface-water system in accordance with permit requirements. The applicant provides sufficient information to ensure compliance with UMC 817.48(c).

The applicant is in compliance with this section of the regulations.

UMC 817.49 Hydrologic Balance: Permanent and Temporary Impoundments

There are no permanent impoundments proposed at the Trail Mountain mine. All temporary impoundments are in compliance with this regulation.

UMC 817.50 Hydrologic Balance: Underground Mine Entry and Access Discharges

There are three active portals at the Trail Mountain mine. These portals are located to prevent gravity discharge of water from the mine. For gravity drainage to occur, the active and abandoned mine workings would have to fill with water. Given the present rate of inflow it is unlikely that this scenario would occur for many decades, if at all. In addition, that water which is not used for dust control and industrial use within the mine is collected by sumps and discharged to the sedimentation pond for treatment. All discharges from the treatment facility must meet current NPDES standards.

With respect to this regulation, the application is in compliance.

UMC 817.52(a) Hydrologic Balance: Ground-water Monitoring

Minimal ground water (eight to ten gpm) is produced within the mine. The majority of this water, augmented by surface-water diversions, is used within the mine for industrial purposes. Dewatering of the mine and discharge to the sedimentation pond approaches an average of 2,000 gallons per week (286 gpd.). A schematic diagram of water balance at the Trail Mountain mine is presented on Figure 7-19 (Appendix 7-19) of the PAP. In-mine water usage is presented in Appendix 7-22 of the PAP. In summary:

Ground-water inflow is approximately 10 gpm = 14,400 gpd
Diverted surface-water inflow is approximately 0.76 gpm = 1,100 gpd
Maximum in-mine water usage is approximately 12.3 gpm = 17,806 gpd
Mine-water discharge is approximately 0.2 gpm = 286 gpd
Diverted surface water for bathhouse use is approximately 2.0 gpm = 2,940 gpd

It should be noted that the figure for in-mine water use is a maximum use value and includes recycled water and peak equipment operation.

Presently the applicant monitors the water quantity and quality at one perennial seep within the mine (UG-1). The applicant has committed to sample any ground-water inflow, which is encountered in sufficient quantities on the working face. The applicant has defined sufficient quantities of water as any springs, leakers, or seeps producing water volume equal to or greater than UG-1 for 48 hours or more. Water samples will be collected from within the mine on a monthly basis and analyzed for the parameters (including discharge) presented on Table 7-2 of the PAP. The applicant has committed to sample the mine sumps on a biannual basis. Such an in-mine ground-water sampling program is more than sufficient to reflect changes in ground-water quantity and quality directly affected by the mining operation.

In addition to the in-mine water sampling program, the applicant is monitoring three adjacent area springs and four spring-fed stock ponds (Figure 7-9 of the PAP). The applicant intends to monitor flow biannually and quality on a

quarterly basis. After the collection of one year's baseline data, the applicant intends to adjust the number of sampling sites, monitoring frequency and monitoring parameters, following consultation with the regulatory authority. Such a monitoring program will be sufficient to reflect changes in ground-water quantity and quality of the springs in accordance with UMC 817.52(a)(2).

Because the springs identified are no closer than 2,000 feet from the westernmost extent of the present mine workings and separated from the mined coal seam by nearly 2,300 feet of overburden, it is not likely that subsidence will have a detectable effect on the spring discharges.

There are no ground-water wells within or in the immediate vicinity of the permit area. Ground-water use in the area is confined to appropriations of springflow and seeps for stock and wildlife watering. Forty years of mining has hindered the collection of adequate data. Mining at the base of the Blackhawk Formation the mine remains essentially dry, proposed mine acreage is small, and mineable coal will be exhausted in less than five years of mining at proposed mining rates. On this basis, monitoring of the presently appropriated water resources will satisfy the requirements of UMC 817.52.

UMC 817.53 Hydrologic Balance: Transfer of Wells

No transfer of wells is considered by the applicant.

UMC 817.13 Casing and Sealing of Underground Openings

The applicant has addressed "abandonment of drill holes" on page 3-5 of the permit document. The applicant has complied with the requirements of this section.

UMC 817.14-15 Casing and Sealing of Underground Openings: Permanent

The applicant has proposed to close the portal by construction of a block seal 25 feet back from the opening and backfilling of the portal with noncombustible material. All loose material will be removed prior to placement of the seal and the seal will be inset into the ribs and floor of the portal. Figure 3-11 on page 3-63 of the PAP shows the proposed closure method.

The proposed sealing plan meets the requirements of UMC 817.15 concerning closure of mine openings, and the requirements of 30 CFR 75.1711-2 of the Mine Safety and Health Administration.

3.3 Conditions

None

IV. PROBABLE HYDROLOGIC CONSEQUENCES

4.1 Existing Environment and Applicant's Proposal

In Section 3.4.3 of the permit application, the applicant states that mining operations at the Trail Mountain mine will have minimal, if any, effect on the existing hydrologic balance. With respect to ground-water impact, the applicant notes that the Trail Mountain mine is a "dry mine," dewatering the working face at an average rate of 10 gpm. Based on the interbedded nature of the overburden and the lack of continuous faults or fractures, which could act as flow paths and propagate the dewatering impact, the applicant contends that the impacts for future mining will be the same as the minor impacts which have resulted from the past 50 years of mining. Local impacts to the movement of ground water in the Blackhawk and North Horn rock units may result from subsidence. Because of the distance of the identified springs from the underground workings it can be concluded that subsidence-related impacts should not directly affect any springs at the Trail Mountain mine. The applicant predicts that acid drainage (page 3-32 PAP) will not be a problem at the Trail Mountain mine and will not impact ground- or surface-water quality.

With respect to surface-water impacts, the applicant predicts that there will be no adverse effects upon the surface-water hydrologic balance due to mining at Trail Mountain (page 3-35 PAP). The applicant notes that the presence of sediment control during mining and the minimal impacts to regional springflow due to Trail Mountain mine's activities should minimize the impacts to surface-water quality and quantity during and following mining.

The applicant suggests (page 3-33 and 3-36 PAP) that the operational and post mining monitoring programs will provide adequate protection of the hydrologic balance.

4.2 Evaluation of Compliance

A Cumulative Hydrologic Impact Assessment (CHIA) has been prepared for the Cottonwood Creek drainage basin and is summarized in Attachment A of this document. The conclusion of this CHIA and the requirements of UMC 817.41 Hydrologic Balance: General Requirements, will be summarized and discussed in relation to the Trail Mountain permit application in the following sections.

4.2.1 General

Three coal mines are active in the Cottonwood Creek drainage basin. They are:

Mine Name	Portal Location	Permit Area Acreage
Trail Mountain	SE1/4 Sec. 25 T17SR6E	773
Wilberg	NE1/4 Sec. 27 T17SR7E	9,500
Des-Bee-Dove	SW1/4 Sec. 26 T17SR7E	2,760

The Deer Creek mine, which overlies the northern portion of the Wilberg mine, is considered part of the Huntington Creek drainage basin.

The relative impacts of each mine are discussed in the CHIA for the Cottonwood Creek drainage basin. Of the three mines described above, Trail Mountain encompasses the smallest disturbance and intercepts approximately 10 gpm of ground water. Water is imported to the mine from Cottonwood Creek for dust control. The Wilberg mine, the largest of the three, intercepts approximately 314 gpm and the Des-Bee-Dove mine intercepts approximately 10 gpm.

4.2.2 Ground-water Impacts

There are no regional aquifers in this coal mining area of Utah. The aquifers and impacts to them are localized. The applicant's spring inventory has resulted in the identification and collection of data from ten springs, seeps, and developed stockponds within three miles of the permit area (Figure 7-1 of the PAP). The four ponds identified in the inventory are sustained by a combination of both surface and ground water. All water sources are located beyond the limits of the affected area. Additional data are collected where ground water intercepts the working face of the mine.

The data collected by the applicant and that available from published sources (Lines, 1984; Davis and Doehlling, 1977; Price and Waddell, 1973) indicate that the existing ground-water system is a series of discontinuous, perched aquifers recharged by snowmelt along the higher plateaus. No high yielding zones have been encountered. The sources appear to dry up as mining progresses further downdip. Geologic data indicate that there are no faults or continuous fractures in the immediate vicinity of the Trail Mountain mine. Hydrologic communication between the various aquifers and the mine workings is limited to seepage from more permeable zones via discontinuous fractures, roof bolts, and intercepted faces. Although the data are not conclusive, dewatering of the overlying aquifers and springs by the Trail Mountain mine has been and should continue to be minimal.

Bull.

Spring flow is highly variable and much of this variation is attributable to changes in annual precipitation, particularly snowmelt. Decreased flow in the springs can be correlated to the occurrence of dry years.

The response to subsidence of various strata overlying the Trail Mountain mining operation is a critical concern to impacts to ground-water quantity and quality. Subsidence of the overlying land surface is expected to occur at the Trail Mountain mine. Because of their respective distances from the underground workings (greater than 2,000 feet horizontal and greater than 1,500 feet vertically), springflows will not be adversely impacted by subsidence. These springs appear to receive recharge from snowmelt along the plateaus to the west of the mine workings and discharge from strata immediately below and to the east of these recharge sources. Subsidence due to Trail Mountain's operations should not impact this flow path. However, subsidence will affect the aquifers immediately overlying the Trail Mountain mine. Subsidence-related fracturing of overburden strata can increase the vertical permeability and enhance hydrologic communication between the locally perched aquifers. The result will be commingling of aquifers and possibly the creation of new springs. It is important to note that premining communication does exist, hence water quality impacts due to commingling will be minimal. Water quantity impacts to these perched aquifers will be restricted to the

translocation of water from one zone to another or to the surface. Given the ground-water system at the site, the redistribution of recharge and discharge immediately above the mine workings will not adversely impact the hydrologic balance.

4.2.3 Surface-Water Impacts

The primary impact on surface waters by the Trail Mountain mine operations is the discharge of surface water from the North Fork of Cottonwood Creek to the bathhouse for shower and culinary purposes and to the underground workings for dust control. The amount of surface water diverted amounts to 4,040 gpd (6.25 x 10-3 cfs) or approximately 0.74 percent of the mean daily flow as recorded by the USGS gaging data (Appendix 7-24 of the PAP). Such a volume of water lost to the surface-water system will have minimal impact to the hydrologic balance. Secondary during-mining impacts include the impounding of approximately 23 acres or 0.2 percent of the Cottonwood Creek watershed for sediment control at Trail Mountain. The Trail Mountain mine sediment pond has discharged once (August 24, 1983) in three years of record. Given the frequency and quantity of historical discharges, it is not likely that there will be any impact to the surface-water system due to NPDES discharges.

Following reclamation, there will be some impact to the surface-water quality of Cottonwood Creek. The applicant proposes to re-establish the banks and bed of the reconstructed channel. The channel bed will be incised onto bedrock and the channel banks will be riprapped. The disturbance due to construction will yield sediment to the surface-water system until the reconstructed channel is established. The applicant proposes to minimize this impact by reconstructing the channel onto its original bedrock floor. Construction will take place during the low flow months, which will minimize the probability of a high runnoff event causing aggravated erosion. There is no practical technology available to reclaim the stream channel without temporarily contributing sediment to the streamflow. Mining-related increases in dissolved or suspended solids are not expected to degrade or preclude anticipated uses downstream of the Trail Mountain mine.

4.3 Conditions

None.

V. EXPLOSIVES

5.1 Existing Environment and Applicant's Proposal

Use of explosives at the Trail Mountain minesite is limited to minor use underground and during construction in the facilities area (see page 3-1 in Appendix 3 of the PAP). Due to the use of explosives on the surface, the applicant must meet the requirements of UMC 817.61 to UMC 817.68. At the facilities area, explosives have been used or will be used for fracturing of large boulders, excavating, and installation of power line poles.

All blasting is done under the supervision of a certified blaster and is conducted to meet the requirements of Utah Permanent Regulatory Program and the requirements of the Mine Safety and Health Administration, Department of Labor.

Due to the varied use of blasting on the site, it is not possible to define a specific blasting pattern. Irregular rock outcrops may require a blasting technique quite different than an irregular boulder in the spoil material. Appendix 3-1 of the PAP generally describes the blasting operation and shows a typical face and hole pattern.

5.2 Evaluation of Compliance UMC 817.61 Use of Explosives: General

Requirements The applicant has stated that compliance with all Federal and State laws will be achieved. In addition, blasting will be conducted by a certified blaster. The applicant has stated that this certification will be in accordance with 30 CFR 850 and applicable regulations of the State of Utah Industrial Commission. The applicant is in compliance with this section of the regulations.

UMC 817.62 Use of Explosives: Preblasting Survey

Other than those owned by the applicant, there are no structures located within one-half mile of the permit area. It is expected that UP&L will be installing a ventilation fan at the Cottonwood Portal at some time in the near future. This regulatory requirement does not apply.

UMC 817.65 Use of Explosives: Surface Blasting Requirements

Currently, there are no existing dwellings or structures within one-half mile of the area which could be affected by surface blasting. Therefore, part (a) of this section does not apply.

The applicant has stated that blasting will occur between sunrise and sunset. The applicant is in compliance with part (b) of this section of the regulations.

Information has been provided concerning the warning and all-clear signals which will be used during blasting operations. Therefore, the applicant is in compliance with part (c) of this section of the regulations.

Access to the site will be controlled until the authorized personnel have determined that no hazards exist as a result of blasting. The applicant is in compliance with part (d) of this section of the regulations.

Airblast is to be controlled so as not to exceed 130 decibels linear peak at any man-made structure or dwelling within one-half mile of the permit area. In addition, there are no structures or dwellings within one-half mile of the permit area other than those owned by the mining company. The applicant is in compliance with part (e) of this section of the regulations.

Blasting will not occur within 1,000 feet of any dwellings, or within 500 feet of any disposal wells, petroleum or gas-storage facilities, municipal waste storage facilities, fluid-transmission pipelines, gas or oil collection lines, or water and sewage lines other than those used by the mining operation. The applicant is in compliance with part (f) of this section of the regulations.

Specific plans have not been provided showing how flyrock will be controlled. However, the applicant has made a general statement of commitment to prevent injury to persons and damage to public or private property. Given the uncertain and limited nature of blasting operations, this commitment is sufficient. The applicant is in compliance with parts (g) and (h) of this section of the regulations.

Specific plans have been provided showing that ground vibration will be controlled. The requirements of the one inch per second ground vibration limit will be met. The applicant has provided a statement of compliance with the scaled distance formula as described in part (1) of this section of the regulations. The applicant is in compliance with this section of the regulations.

UMC 817.67 Use of Explosives: Seismographic Measurements

Since the applicant has committed to using the scaled distance formula for control of ground vibration, seismographic measurements are not required.
UMC 817.68 Use of Explosives: Records of Blasting Operations The applicant has provided a sample blasting record which shows that all information required by this part will be recorded. The applicant is in compliance with this section of the regulations.

5.3 Conditions

None

VI. MISCELLANEOUS COMPLIANCE

The miscellaneous compliance sections of the permit application (UMC 817.11 Signs and Markers; UMC 817.131-132 Cessation of Operations: Temporary and Permanent; UMC 817.180 Other Transportation Facilities; and UMC 817.181 Support Facilities and Utility Installations) have been reviewed and found to be in compliance with the performance standards for these regulations.

Also reviewed were the requirements of UMC 782.13 and .14 concerning identification of interests and compliance information. The Trail Mountain Coal Company was identified as the applicant and the Natomas Coal Company as the principal shareholder. Although previous correspondence had indicated otherwise, the Diamond Shamrock Coal Company was not identified in the compliance and interests sections at all. It has since been determined that although Trail Mountain and Natomas Coal Companies are the immediate interest holders in the mine, the Diamond Shamrock Coal Company may have de facto control over the Trail Mountain mine operations. Therefore, Diamond Shamrock Coal Company could be considered as a "principal shareholder of the applicant" within the meaning of UMC 782.13(b)(1).

Research by the Albuquerque Field Office of OSM indicates that there are no prior violations of applicable law related to the Diamond Shamrock Coal Company.

6.1 Existing Environment and Applicant's Proposal

UMC 817.59 Coal Recovery

The Trail Mountain mine is located in the Wasatch Plateau coal field, geologically in the Mesaverde Group. In the mine lease area, the Mesaverde Group comprises, in ascending order, the Starpoint Sandstone, the Blackhawk Formation, and the Price River Formation. Overlying this group is the North Horn Formation of the Wasatch group. The coal seam to be mined is located in the Blackhawk Formation along with several other seams. These seams are in ascending order the Hiawatha, Upper Hiawatha, Cottonwood, Blind Canyon, Bear Canyon, Upper Bear Canyon, and the Upper Grimes Wash.

The mining operation is located in the Hiawatha seam. This seam varies in thickness throughout the lease area from four to eight feet. Within the lease tract, development of the operation is almost complete. The mains have been driven to the southern boundary of the lease area, and the west panels have for the most part been developed and in some areas retreat mined. The east panels have not yet been developed. The applicant has proposed a mine layout in the Hiawatha seam to maximize recovery given the constraints of the already developed mains and panels, and the the requirement to leave a coal barrier along the outcrop and lease boundaries. In addition, coal is not being recovered in the east panels by retreat mining methods. This coal is being left to support the overlying steep hillside to prevent slope stability problems. The amount of coal to be recovered by the operation is shown in Table 3-1, page 3-17A of the PAP. The overall recovery by the operation in the Hiawatha seam is 65 percent.

Initial mining of the lower seam generally precludes mining in any upper seams. Since the Hiawatha seam is the lowest coal seam in the Blackhawk Formation, historic and modern mining operations preclude recovery of coal in the upper seams. However, according to two studies by the Department of the Interior (see page 3-11 of the PAP), these upper seams are not mineable due to their highly lenticular, thin and discontinuous nature. Only small areas of the lease tract are currently undisturbed, and coal located above the Hiawatha could not be economically recovered due to the limited areal extent of the remaining reserves.

6.2 Evaluation of Compliance

The applicant has proposed a plan which maximizes the recovery of the economically recoverable coal in the lease tract. The Hiawatha target seam will be recovered to the maximum extent possible given the constraints associated with retention of barrier pillars and protection of the environment. The application is in compliance with the requirements of UMC 817.59. The Bureau of Land Management issued approval for the Resource Recovery and Protection Plan on April 18, 1984.

6.3 Conditions

None.

VII. UNDERGROUND COAL DEVELOPMENT AND COAL PROCESSING WORK

7.1 Existing Environment and Applicant's Proposal

The applicant has a small amount of coal processing waste located in the facilities area near the tipple. Upon completion of mining, the applicant has proposed that this material be disposed of in the mine (see page 6, Appendix 9 of the PAP). Provisions have been made in the bond estimate for haulage of the material underground using a low-profile Jeffry. This piece of equipment meets the requirements of MSHA for work underground (see page 6-A, Appendix 9 of the PAP). With this type of disposal method the requirements of these sections are not applicable, except as relates to protection of ground-water quality. The applicant notes that since minimal ground water enters the mine, no significant impacts are anticipated. See the ground-water section (Chapter III) of this document for additional information.

7.2 Evaluation of Compliance

UMC 817.71-74 Disposal of Underground Development Waste and Excess Spoil

The applicant does not have any plans for disposal of these types of waste material on the surface. Therefore, the requirements of these regulations do not apply.

UMC 817.81-85 Coal Processing Waste

The applicant is not proposing disposal of coal waste in a manner which is regulated by these sections. See Section UMC 817.88, Coal Processing Waste: Return to Underground Workings.

UMC 817.86 Coal Processing Waste: Burning

The applicant has provided specific plans for extinguishing any fires that might develop in the coal waste area and in other areas of the surface facilities operation. This plan is described starting on page 3-21 of the PAP. Permit approval will serve as OSM approval of the plan. Telephone conversation from OSM to Mr. Bill Denning of MSHA indicated that MSHA does not require approval of fire extinguishing plans for coal processing waste piles until a fire is active and a mitigation plan is submitted. The applicant is in compliance with this section of the regulations.

UMC 817.87 Coal Processing Waste: Burned Waste Utilization

The applicant has not proposed any activities which would be regulated by this part.

UMC 817.88 Coal Processing Waste: Return to Underground Workings

As part of the reclamation plan, the applicant is proposing to dispose of coal waste material (not produced by processing of coal) underground. Telephone conversation with John Bishop of MSHA District 9, indicates that MSHA has been in contact with the applicant concerning methods for disposal of these coal wastes underground. The applicant was advised to submit a disposal plan to MSHA for approval prior to reclamation.

UMC 817.91-93 Coal Processing Waste: Dams and Embankments

The applicant is not proposing disposal of any coal wastes in dams or embankments. Therefore, the requirements of these regulations do not apply.

7.3 Conditions

Within 60 days of permit approval the operator shall submit to MSHA a plan for disposal of coal wastes underground as proposed in the permit application, and shall implement the plan upon approval by MSHA. Disposal will take place only in the fee coal areas of the mine.

VIII. PROTECTION OF FISH, WILDLIFE, AND RELATED ENVIRONMENTAL VALUES

8.1 Existing Environment and Applicant's Proposal

Terrestrial vertebrate and aquatic invertebrate species inhabiting the mine permit area and vicinity are typical for this region of the Wasatch Plateau. The mine permit area's wildlife resources are described in Chapter X and Appendix 10 of the PAP.

Several game and high-interest terrestrial species inhabit the general vicinity of the permit area. Mule deer is the most prominent big-game species. Much of the land surrounding the mine permit area is classified by the UDWR as high-priority or critical mule deer winter range. However, the mine permit area and mine-related surface disturbances do not occur within high priority or critical mule deer winter range. Portions of the Trail Mountain access road do traverse critical and high priority mule deer winter range along Cottonwood Creek. This access road is a County road which was established prior to the promulgation of SMCRA. The potential for mule deer road-kills along this road and the applicant's proposed mitigation plan is discussed below.

Cliffs within and near the permit area represent potentially valuable cliff-nesting habitat for several species of raptors (e.g., golden eagle, red-tailed hawk, and prairie falcon). Wooded habitat within the permit area also provides nest sites for tree-nesting species such as goshawk, Cooper's hawk, sharp-shinned hawk, red-tailed hawk, American kestrel, and screech owl. The bald eagle is a winter visitor in the area.

No fish species occur in North Cottonwood Creek in the vicinity of the mine; however, the lower portion of Cottonwood Creek, below its confluence with Straight Canyon Creek, does support trout and is designated as a Class 3 fishery. Cottonwood Creek is also a tributary to the Colorado River.

The applicant's plan for protection of fish and wildlife is presented on pages 10-61 to 10-67 and in Appendices 7 and 10 of the PAP. The applicant has committed to educating its employees on the need to avoid harassing wildlife, especially during critical life history periods. In addition, mine employees will be informed of the potential for mule deer/ vehicle collisions along the Cottonwood Creek Road. The applicant has agreed to monitor deer road-kills, in conjunction with the UDWR and USFWS, along the access road to and within the mine permit area. Deer road-kills will be reported to the UDWR and USFWS, and if any problem areas are identified, the applicant will consult with these agencies to determine appropriate mitigation measures. To reduce the potential for deer/vehicle collisions, the applicant has committed to posting signs requiring reduced speed limits (from November 1 to May 15) along the access road from Highway 10 to the minesite.

Other commitments made by the applicant (pp. 10-61 and 10-62 of the PAP) include: (1) monitoring and notifying the appropriate regulatory authority of the occurrence of moose, threatened and endangered species, and nesting raptors on the mine permit area, (2) establishment and posting of a UDOGM

approved buffer zone in the vicinity of the Cottonwood Creek culvert, (3) prohibiting off-road vehicle use within the permit area, and (4) monitoring benthic macroinvertebrates in Cottonwood Creek above and below the mine disturbance area to check the effectiveness of sediment control measures (Appendix 7-13 and 7-13.1 of the PAP). Benthic macroinvertebrates will be monitored quarterly in conjunction with the hydrology monitoring program. Macroinvertebrate data will be reported to the regulatory authority on a yearly basis.

The 12 KV line that serves the Trail Mountain mine has been determined by the USFWS to be raptor safe (November 10, 1982 letter in the concurrences section of the decision document). The power poles along this line have an armless configuration that prevents perching by raptors.

Following cessation of mining, the applicant will restore the Cottonwood Creek stream channel and recontour and revegetate disturbed sites. Plant species selection was based on the establishment of wildlife habitat as the principal postmining land use. Details of the revegetation plan are provided in Appendix 9 of the PAP.

8.2 Evaluation of Compliance

UMC 817.97 Protection of Fish, Wildlife, and Related Environmental Values

Surface disturbances associated with the Trail Mountain mine approximate 8.8 acres. A small portion of this disturbance has occurred in riparian habitat along Cottonwood Creek. All disturbed areas will remain for the life of the mine. Although a small portion of the riparian habitat has been disturbed by construction of the stream culvert, the County road has long been the major factor deterring wildlife use of the riparian habitat since before the mine's establishment. The County road which provides access to the permit area runs along the easternmost edge of both the disturbed and undisturbed riparian habitat. The current mining operation provides some mitigation of riparian disturbance by significantly reducing sediment load downstream from the mining operations as compared to pre-law sediment loads. Because of the limited areal extent of these disturbances, wildlife impacts resulting from loss of habitat will remain relatively minor.

None of the areas affected by the mine represent any critical habitats for threatened or endangered wildlife species. The bald eagle is a winter visitor to the region but will not be affected by mining activities. Since the mine withdraws water from Cottonwood Creek (4,040 gallons/day; see TA Section 4.2.3), there is a slight potential that populations of the Colorado squawfish and humpback chub in the Colorado River could be affected by reduced flows to the Colorado River. The U.S. Fish and Wildlife Service has found that "the issuance of a permit to allow continued operation of the Trail Mountain mine is not likely to jeopardize the continued existence of the Colorado squawfish..." or the humpback chub provided that the applicant contribute $70 (based upon stream depletion of 4.53 acre feet per year) to the Fish and Wildlife Service fund for the conservation and recovery of the endangered Colorado River fishes. The applicant responded by forwarding a check for $70 to the U.S. Fish and Wildlife Service on May 9, 1984.

Mine-associated wildlife impacts, other than direct loss of habitat, include human harassment of all wildlife, mule deer road-kills, and degradation of water quality in Cottonwood Creek. The effects of human harassment on wildlife, either inadvertent or purposeful, should be considered from a cumulative standpoint since at least three other mines are currently operating along the southern end of East Mountain. However, since premining baseline data for wildlife populations in the area are lacking, these effects are extremely difficult to quantify. At a minimum, mining activities have and will likely continue to preclude raptor nesting activity in the vicinity of the mine facilities. The potential for mule deer road-kills is greatest during the winter months when mule deer congregate in high-priority or critical winter range traversed by the Trail Mountain access/haul road. However, unless a particularly hazardous area is identified by UDWR monitoring, this impact is not expected to be significant.

The applicant has complied with the requirements of this section.

8.3 Conditions

None.

IX. BACKFILLING AND GRADING

9.1 Existing Evironment and Applicant's Proposal

Backfilling and grading of the site will commence after reclamation sediment control structures have been constructed, and upon completion of removal of facilities, coal waste material, the removal of the sediment pond, and closure of the portals. The backfilling and grading plan generally consists of the removal of material used to construct the bench area and cover the culvert used to divert Cottonwood Creek and the tributary which crosses the facilities area, and placement of that material at its approximate original location along the west slopes (Appendix 9, pages 7-9). Currently the west slopes have rock cuts which range in height from 34 feet to 50 feet and are located in the Starpoint Sandstone and the Blackhawk Formation. The reclaimed fill slopes will be constructed at 25 to 30 degrees and a 15 to 20 foot exposed slope face will remain after backfilling. This is permissable under UMC 817.101 (b)(8). In addition, portions of the Starpoint Sandstone will remain as mid-slope outcrops. The backfilling and grading plan is an optimization of the use of the available spoil material to cover as much of the rock cuts as is feasible yet not create a fill slope that is excessively steep. To reduce the slope on the fill, it would be necessary to either expose more highwall or to use more fill material. The applicant has stated that the latter option is not feasible due to the lack of additional fill at the site.

The applicant's proposal requires the retention of several sections of rock and placement of fill on steep slopes. As such the stability of these slopes is critical. The applicant has provided stability analyses in the PAP (Appendix 2) showing that the postmining fill slopes and rock cuts will be

stable. The method used in the stability analysis for the fill and the cut in the Blackhawk Formation was the Modified Bishop method using the STABL2 Computer Program developed by Purdue University. The applicant has stated that the use of this method for the cut slope in the Blackhawk Formation was justified because of the closely spaced jointing of the rock units relative to the cut height and lack of continuous planes or discontinuities which would promote a plane sliding or block failure. The program generates 100 potential failure surfaces and provides graphical output of the 10 most critical slopes. The fill slopes and the cut slopes in the Blackhawk Formation were found to have safety factors greater than 1.3 in the existing rock cuts, and greater than 2.0 in the postmine rock cuts. The fill slopes are expected to have safety factors greater than 2.03.

In their analysis, the applicant has determined that the rock cuts in the Starpoint Sandstone are stable due to the massive characteristics of that strata. The applicant adds that the bedding plane attitudes are not conducive to wedge or toppling failure which would be the expected mode of failure for this strata.

To stabilize the slopes with respect to runoff, the applicant has proposed the use of contour trenching. The Surface-Water section (Chapter II) of this document discusses the issues surrounding the use of these types of structures for runoff control and sediment control.

Prior to backfilling of the slopes, the applicant is proposing to underground disposal of all coal waste, coal material and sediment from the sediment pond. Based upon laboratory analyses the applicant indicates that certain cut-and-fill material might be unsuitable as a growth medium due to high EC and/or SAR levels. This unsuitable material will be buried under four feet of non-toxic fill after grading. Further discussion of this topic can be found in Section 9.2, UMC 817.103 of this document.

No undisturbed areas will be affected during this permit term. The applicant has committed to temporarily revegetating all disturbed areas not required for mine operation. Final reclamation of the minesite is scheduled to begin in 1986 (Table 3-2) following cessation of mining.

9.2 Evaluation of Compliance

UMC 817.99 Slides and Other Damage

The applicant has provided a specific plan for reporting of slides and other damage to the regulatory authority (see page 17-C of the PAP). The applicant is in compliance with this section.

UMC 817.101 Backfilling and Grading: General Requirements

The applicant has proposed a backfilling and grading plan which will return the facilities area to a stable landform which will resemble the premining topography. The stability factors for both fill areas and rock cuts as determined by the applicant were found by the regulatory authority to be suitable. Engineering aspects and reclamation design as submitted were also found to be suitable.

The applicant is in compliance with this section of the regulations.

UMC 817.103 Backfilling and Grading: Covering Coal and Acid and Toxic-Forming Materials

The applicant has committed to bury coal waste piles in the underground operation during reclamation. In addition, the applicant will scrape the surface of the spoils on which the pile was located as well as the spoil surface around coal handling facilities to eliminate potential coal fines contamination.

The applicant has submitted laboratory analysis for eight sets of spoil samples (46 individual samples, Appendix 9) taken on the disturbed area. Analyses show that existing spoil contains moderate to high EC and SAR levels at various depths. Such spoil would not be uniformly suitable as a seedbed material. However, these samples were taken in a former salt storage area used by the former mine owners (The Fedderholf Group), and alongside the road where roadside salt deposits tend to accumulate. Reference areas and nearby vegetation indicate that the high EC and SAR levels are elevated, but not, on average significantly so.

The regulatory authority has required that the removal and redistribution of on-site materials during backfilling and grading result in maximum electroconductivity values of eight mmhos/cm in the upper six inches, and 16 mmhos/cm in the underlying 18 inches, so that salinity in the upper two feet of the regraded, seeded surface will be limited. Materials approximating these limits will be included in the proposed test plots to confirm feasibility of reclamation success.

The applicant is in compliance with requirements of this section.

UMC 817.106 Regrading or Stabilizing Rills and Gullies

The applicant has provided a specific plan for monitoring and regrading of rills and gullies as required by this part (see page 17-C of the PAP).

The applicant is in compliance with this section of the regulations.

9.3 Conditions

None.

X. SUBSIDENCE CONTROL PLAN

10.1 Existing Environment and Applicant's Proposal

Description of Operations

The Trail Mountain mine is a room and pillar operation using continuous miners for coal extraction. The seam which will be recovered is the Hiawatha seam which ranges from 4 to 8 feet thick in the mine area. The operation is laid out with one set of mains running in a north-south direction with panel development east and west of the mains (see Figure 3-6, page 3-12, in the PAP). The east panels extend towards the coal outcrop under the cliffs formed by sandstone layers in the overlying strata. The west panels have been driven into deeper coal due to the topographic rise above the mine and because the strata dip three to five degrees to the southwest. Overburden thickness ranges from zero feet at the outcrop to 1,920 feet (see the Overburden Isopach Map, page 6-8, in the PAP). Once panel development is complete, pillar extraction will occur in the west panels.

Geologic Setting

The Hiawatha coal seam is located in the lower portion of the Blackhawk Formation, directly above the Starpoint Sandstone which is a marker bed between the Blackhawk and the Mancos Shale. Approximately 200 feet above the Hiawatha seam is the Blind Canyon seam and 750 feet above this seam is located the Castlegate Sandstone. This massive sandstone is almost 200 feet thick in this area and is a prominant steep slope former. Above this is the Price River Formation which is sandstone and interbedded shale and conglomerate and is approximately 350 feet thick. Above this is the North Horn Formation which is interbedded shales and sandstones. All of the above noted formations are part of the Mesaverde Group. The geology of the mine plan area is described in the PAP in Chapter 6. Additional discussion can be found in the introductory section of this document.

Renewable Resources and Structures

Above the mine are renewable resource lands (see page 3-55 in the PAP). Light grazing and recreational use such as hunting occurs above the mine area. These are limited due to the existence of steep slope areas. No structures have been identified above the mine e.g., oil and gas wells, pipelines, and power lines. Springs exist in the vicinity of the mine area. The closest spring is located almost half a mile to the west of the permit boundary. The area above the mine also provides wildlife habitat.

Subsidence Control Plan

The applicant's subsidence control plan is to obtain even settling of the land surface over the west panels by maximum coal extraction and to retain stable pillars under the steep slope area to maintain the integrity of the slope (see

Section 3.4.8.2, page 3-56 in the PAP). Using prediction techniques described by Orchard (1973) and based upon observation in the adjacent UP&L Deer Creek mine (see pages 12-7 to 12-10 to the PAP), the applicant predicts that subsidence will vary from zero to 2.63 feet in the mine area over the west panels. The applicant's approach considers a panel width of 800 feet in the worst-case situation. This condition occurs in an area where the 60-foot chain pillar is expected to be crushed. In other areas of the mine, the chain pillars have been designed to be permanent and are 110 to 170 feet thick. Therefore, the maximum amount of subsidence estimated at 2.6 feet is representative. Retention of these permanent chain pillars will not allow for a continuous subsidence trough over the mine area. The applicant does not expect this to be a problem given the topography and use of the surface lands. Given the depth of cover and the existence of the massive sandstone layer which would tend to reduce the effects of subsidence, the applicant does not expect cracking at the surface to be a significant problem in the area over the west mains.

To control subsidence on the steep slope on the eastern edge of the mine area, the applicant is proposing to leave a 325 foot boundary of unmined coal between the coal outcrop and mining (page 12-11 of the PAP). The depth of cover over the eastern edge of mining at this boundary ranges from 240 to 325 feet depending upon the slope of the hillside. From the 325 foot boundary to the mains, a distance ranging from approximately 550 feet to 1,250 feet, pillars will be left on 80 by 80 foot centers with an entry width of 20 feet. The maximum thickness of overburden in this area is approximately 1,200 feet.

Also located over the permit area are steep slopes formed by the Castlegate Sandstone. The cliff area extends across the top of the mine mains. In other areas in Utah, mining under a steep slope edge has resulted in slope failures along the slope. At the Trail Mountain mine, the location of the slope over the mains will minimize subsidence in this area. However, it can be expected that some subsidence might occur due to the angle of draw effects and subsidence over the west panels. If failure of the slope did occur, it would most likely be a slump. Toppling failure is possible. Toppling naturally occurs as a result of normal weathering processes in the vicinity of the mine, as is evidenced by large talus blocks located at the base of the slopes. For the most part the steep slope is located at the edge of the subsidence trough. The effects of subsidence will be to tilt the slope into the hillside which would reduce the possibility of toppling failure. The dip of the strata into the hillside also reduces the possibility of this type of failure. The effect of the subsidence is uncertain due to the lack of information on the stability of the slope edge and the amount of subsidence which might occur.

Subsidence Monitoring

The monitoring plan proposed by the applicant consists of installation of survey monuments using conventional survey methods and monitoring of the monuments by surveying or photogrammetric methods. The subsidence monitoring plan is described on pages 12-12 to 12-14. Stations are to be established both parallel and perpendicular to the panel development. The exact spacing and location of the stations have not been identified nor have stations which will be monitored conventionally or by photogrammetric methods, previously

identified. Figure 12-2 does not show any subsidence monitoring points located over the proposed workings. In addition to the above described surveying, visual inspections will be conducted to identify subsidence effects such as fractures, cracks, potholes, etc. Subsidence monitoring is to be conducted in the fall of each year and monitoring reports are to be submitted annually.

Public Notice

Surface owners which might be affected by subsidence will receive a mining schedule showing the area where mining is to take place, and the date of the activity (see Appendix 12-5). Information will be provided on the time of notification to the land owner and the measures to be taken to prevent or control adverse surface effects.

Surface Owner Protection

The applicant has proposed to conduct mining operations in a manner which will prevent the subsidence from causing material damage. Therefore, the company does not intend to take out renewable insurance covering subsidence damage. The applicant has stated that there are no structures which could be damaged by subsidence; therefore insurance for structures is not needed. The applicant has stated that trails which may be effected by subsidence will be repaired.

10.2 Evaluation of Compliance

UMC 817.121 Subsidence Control: General Requirements

The applicant has prepared a subsidence control plan showing how the proposed operation will prevent or control subsidence. Subsidence effects on the steep hill sides will be controlled by leaving a 325-foot wide unmined barrier and by first mining in areas in the east mains. The pillars which will be left will be 60 feet by 60 feet. Based upon information presented by Wilson (1972), this size of pillar can be considered stable over the long-term with the depth of cover in this area and an entry width of 20 feet. The possibility exists that mining could affect the stability of the Castlegate Sandstone steep slopes. However, state of the art subsidence analysis technology does not permit full quantification of these effects. Continued monitoring will identify the potential significance of this possibility.

A subsidence monitoring program has been proposed by the applicant which incorporated both conventional and photogrammetric survey methods, and visual inspections. The conventional method is proposed to be used only when the photogrammetric surveys are not conducted. The applicant has identified the location of the survey monuments over the mine, and committed to reporting the results of subsidence surveys to the regulatory authority within six months of survey completion.

The applicant is in compliance with this section of the regulations.

UMC 817.122 Subsidence Control Plan: Public Notice

The applicant has provided for public notice to all affected landowners above the underground workings. The notification will identify the areas in which mining will take place and the planned date for mining. Measures to be taken to prevent or control adverse surface effects to the landowners will be incorporated into the public notice. The applicant is in compliance with UMC 817.122.

UMC 817.124 Subsidence Control Plan: Surface Owner Protection

The applicant has proposed to mitigate impacts to trails. Information has not been provided on mitigation of slope failures which might occur. As mining progresses and additional information is obtained on subsidence impacts, if any, additional mitigation measures may be necessary. These will be determined by the applicant and approved by the regulatory authority on an annual basis .

Trails and slope failures have been identified as the only surface effects which may be applicable to this rule. The applicant is in compliance with UMC 817.124.

UMC 817.126 Subsidence Control: Buffer Zones

The applicant has provided for a 325-foot buffer between the coal seam outcrop and the areas where mining will commence. In addition, only limited mining will occur from this boundary to the mine mains. The applicant has not proposed any mining which will materially damage any water resources, structures, or aquifers.

The applicant is in compliance with this section of the regulations.

10.3 Conditions

None.

XI. REVEGETATION

11.1 Existing Environment and Applicant's Proposal

Pursuant to UMC 783.19 and 817.116, the applicant established two reference areas within the permit area representative of adjacent Riparian and Grassland-Shrub communities. These reference areas were approved by the regulatory authority (see Attachment B, Appendix 9, PAP). The applicant also made the commitment to the proper management of the area with inspection, maintenance, and re-seeding as needed throughout the duration of mining and reclamation. The disturbed area will be reclaimed to two vegetation community types, Grassland-Shrub and Riparian. Reclamation techniques differ to some

degree for each type. The area to be planted to the Grassland-Shrub community will be broadcast seeded following fertilization. A land imprinter will be pulled behind the dozer as a seedbed preparation treatment at the time of seeding. The planted slope will be mulched using erosion control mats. Containerized seedlings will be planted the following spring.

Fertilizer will be applied in the Riparian community as discussed in Section I. Topsoil of this document. The bulldozer will also be equipped with a disc to relieve surface compaction, prepare the seedbed, and incorporate the fertilizer. The seed will then be broadcast over the area with the spreader and the surface harrowed to cover the seed. The site will be mulched using erosion control matting and containerized stock planted the following spring.

Plant species selected for revegetation for both communities (Appendix 9, Tables 2 and 3) are either native to the area or are considered to be appropriate additions added to increase species diversity. Poa praetensis is the only introduced species scheduled for planting.

Test Plot Program (Appendix 9, pp. 18 through 30 of the PAP)

Test plots will be constructed at the northwest portion of the permit area. The objective of the test plots is to determine species best adapted to the seedbed material encountered on site.

The 0.3-acre test plot will be graded, contoured, and divided into two sections. Each section will be planted with a different seed mixture. Mixture I will be identical to that proposed for final revegetation of the Grassland-Shrub community. Mixture II will contain a variety of native and introduced species. Fertilizer and seed will be broadcast over the graded surface. The seedbed will be raked to incorporate the fertilizer into the soil and cover the seed. The plot will be mulched using erosion control mats. Containerized stock will be planted the following spring.

Test plots will be monitored on a yearly basis to evaluate revegetation success. Vegetation sampling methods will simulate those designed for reference areas. Soil samples will be taken and analyzed to evaluate chemical variations within the seedbed through time.

11.2 Evaluation of Compliance

Although difficult on the steeper slopes, revegetation is considered feasible. The applicant has committed to identifying and burying fill materials exhibiting high EC and SAR values. This will result in the return of the best quality fill to the surface following grading. The revegetation species proposed are appropriate for the climate conditions to be encountered. The planting mixtures proposed should be successful if adequate rainfall is received on site, erosion is controlled, and grading results in the proper burial of spoil material exhibiting high EC and SAR levels.

Canyon sweet-vetch (Hedysarum occidentale var. canone) has been observed and collected by Manti-LaSal National Forest personnel at the Trail Mountain mine inhabiting areas adjacent to the Cottonwood Canyon road within the Trail Mountain permit area. Hedysarum occidentale var. canone has been recommended as a threatened species by Dr. Stanley Welch of Brigham Young University. Canyon sweet-vetch appears to prolifically invade disturbed areas such as road cuts (Kunzler, Utah Division of Oil, Gas and Mining, personal communication, June, 1984).

Trail Mountain mine does not propose any additional surface disturbance for the life-of-mine. However, reclamation of the minesites could potentially destroy plants that have become established on disturbed areas such as cut and fill banks, stockpiles, or interim revegetated areas. These areas frequently require additional earthwork to blend the minesite into the natural landscape as required by UMC 817.101 and 817.103. As mitigation for potential impacts to populations of Canyon sweet-vetch, a survey of the areas to be redisturbed should be conducted to identify and record locations of individuals and populations. Such a survey must be performed before any redisturbance takes place.

UMC 817.111 Revegetation: General Requirements

The applicant has complied with the requirements of this section.

UMC 817.112 Revegetation: Use of Introduced Species

Poa praetensis is proposed for seeding in Appendix 9. This species is considered to be a naturalized species due to its wide geographic distribution and is therefore acceptable for planting.

UMC 817.113 Revegetation: Timing

The proposed schedule for revegetation conforms to accepted standards. Revegetation activities will be accomplished during recognized planting seasons. Seeding and mulching techniques are in accordance with standard accepted practices.

The applicant has proposed that 90 seedlings/acre total of woody plant species will be planted for the Riparian community in proportions equal to that found in the reference area. The application is in compliance with this section of the regulations.

UMC 817.114 Revegetation: Mulching and Other Soil Stabilizing Practices

The applicant has complied with the requirements of this section.

UMC 817.116 Revegetation: Standards for Success

The applicant has proposed acceptable methodologies for sampling cover, productivity, and density parameters on both communities to be reclaimed and their corresponding reference areas as presented in Appendix 9 of the PAP. Cover will be determined with a point-hit or ocular quadrat technique while density will be measured by means of the point-center-quarter method. Productivity will be determined with a double sampling technique involving clusters of five quadrats (one clipped, four estimated) at each sample point. Samples will be collected in each community and reference area until estimates to within 10-percent of the true mean can be determined with 90 percent confidence in the Grassland-Shrub community and 80 percent confidence in the Riparian community.

Testing will occur each of the last two years of the responsibility period and will involve a t-test of the means between reference and revegetated areas for each variable--cover, production, and density. The criteria for successful testing have been identified and are in accordance with the regulations. These criteria will ensure that revegetated areas have replaced cover, productivity and density of woody species to within 90 percent of that found on the reference areas with 90 percent confidence. This is more than an acceptable standard. With respect to the establishment and management of adequate reference areas, the application is in compliance.

UMC 817.117 Revegetation: Tree and Shrub Stocking for Forest Land

The applicant has complied with the requirements of this section.

11.3 Conditions

Before any site redisturbance takes place, the applicant must conduct a survey, under supervision of the regulatory authority, of the areas to be redisturbed. The survey shall identify and record locations of individuals and populations of Hedysarum occidentale var. canone (canyon sweet-vetch). If canyon sweet-vetch is found in the portions of the permit area to be redisturbed, the mine operators must develop a mitigation plan for regulatory authority approval before redisturbance takes place.

See additional condition identified by the U.S. Forest Service in Attachment A of the permit (Conditions).

XII. ROADS

12.1 Existing Environment and Applicant's Proposal

The Trail Mountain mine represents an existing operation established prior to enactment of the Surface Mining Control and Reclamation Act. The facilities are situated in a narrow canyon area that also accommodates a public road. Because of the topographically controlled, confined surface area, the mine is situated adjacent to the public road. This is a situation necessary for both facilities to operate and existed when the mine operation was approved under the interim permitting process.

Portions of the road which provides access to the mine are owned by the County, and the Forest Service with private right of way along the North Fork of Cottonwood Creek. The road is used by mine personnel and their private vehicles, coal trucks for haulage, and by the public for access to the upper canyon. Transportation and roads are discussed on page 3-9 of the permit application. Parking areas are maintained on the property south of the office buildings for mine employees. Surface structures and roads are presented on Figure 3-5 of the PAP. The applicant has not constructed any roads on the permit area. Graded access points over the stream diversion culvert have been constructed along the Forest Service/County road. These access points are essentially smooth graded areas to allow vehicles to drive off of the road and onto the mine parking area. These graded access points will be reclaimed upon removal of the Cottonwood Creek diversion culverts. Miscellaneous rights of way exist on the parking area to provide access to the scale house, water storage tank, generator house and portals. There are no constructed roads within the facilities area.

12.2 Evaluation of Compliance

UMC 817.150-176 Roads

The mine is situated adjacent to a public road. This is a pre-law existing situation necessary in the narrow canyon location. There are no constructed roads. The applicant has constructed graded access points over the stream culvert to the parking area from the Forest Service road. The application is in compliance.

12.3 Conditions

None.

XIII. ALLUVIAL VALLEY FLOORS

13.1 Existing Environment and Applicant's Proposal

The facilities of the Trail Mountain mine are situated in a narrow canyon with steep side and valley slopes. The canyon lacks topsoil and does not contain land, which could support agricultural activities. The canyons in which the surface facilities are located contain deposits of landslide material, slope wash, erosion debris from adjacent slopes, and alluvial material. The surface facility and mine permit area is in upland land forms, and is not located in an area where there is existing or potential agricultural activities.

13.2 Evaluation of Compliance

UMC 785.19 Underground Coal Mining Activities on Areas or Adjacent to Areas Including Alluvial Valley Floors in the Arid or Semiarid Areas of Utah

An assessment of materials contained in the application and visits by the Regulatory Authority to the site confirm that there are no alluvial valley floors in or adjacent to the permit area and underground disturbance of aquifers by mining will not affect surface-water use or downstream alluvial valley floors.

The applicant is in compliance with this section.

13.3 Conditions

None.

XIV. POSTMINING LAND USE

14.1 Existing Environment and Applicant's Proposal

Land use is discussed in Chapter IV of the PAP.

Premining use of the permit area was wildlife habitat, recreation, and livestock grazing. Livestock grazing is limited because of the predominance of rocky, rugged terrain in the mine plan area. Cattlemen and recreationalists use the road in Cottonwood Canyon for access to areas above the Trail Mountain mine.

The applicant intends to return the minesite to its premining land uses of wildlife habitat, livestock grazing, and recreation. Following cessation of mining, all facilities will be removed and disturbed areas will be recontoured to blend into the existing terrain. Revegetation will be implemented as described in Appendix 9 of the PAP. Vegetation will be re-established to be comparable to species diversity, cover, density, and productivity of the established reference areas.

14.2 Evaluation of Compliance

UMC 817.133 Postmining Land Use

The applicant has complied with the requirements of this section. See concurrence letters from the U.S. Forest Service and BLM.

14.3 Conditions

None.

XV. AIR RESOURCES

15.1 Existing Environment and Applicant's Proposal

The Trail Mountain mining operation has some effect on the air quality of Cottonwood Canyon. Dust production at the mine is the main contribution. The areas that are the highest producers of dust are coal haulage down canyon from the mine, coal handling, and surface winds over the disturbed area.

Several practices are incorporated at Trail Mountain mine to protect the air quality in the mine vicinity (page 11-5 of the PAP). Protection of the air quality is mainly accomplished by reduction of dust production by the mine operations. Practices used to reduce dust production are:

1. Periodic watering, scraping, and compaction of coal haulage road;
2. Wetting of coal during handling activities;
3. Keeping the size of the disturbed area to a minimum;
4. Revegetation of disturbed areas as soon as practicable (page 3-54 of the PAP).

Plans to monitor the air quality in the vicinity of the Trail Mountain mine have not been considered or incorporated in the mining and reclamation plan. The effect on air quality by the mine will be minimal due to the limited area and the mitigation measures incorporated in the operations.

15.2 Evaluation of Compliance of Proposal

UMC 817.95 Air Resources Protection

The applicant has addressed adequately all major topics of this section, and is in compliance with the regulation.

15.3 Conditions

None.

XVI. BONDING

16.1 Applicant's Proposal

The applicant has prepared and submitted to the regulatory authority a reclamation cost estimate for the purpose of obtaining a bond (UMC 784.13) (see Appendix 9, Tables 1 and 7). The costs include reclamation of lands disturbed by mining including coal handling, storage, and transporting within the facilities area. The applicant has identified one bonding increment. Cost estimates are based on the 1984 Means Cost Construction Data, 1983 Rental Rate Blue Book, and from Swains John Deere Farm Equipment (see the footnotes to Table 7 PAP).

16.2 Evaluation of Compliance

UMC 800.11 Requirements to File a Bond

1.a. The applicant has requested a permit term of five years.

1.b. The revegetation liability period pursuant to UMC 817.116 (b) shall be ten years because permit area annual precipitation is substantially less than 26 inches.

UMC 800.13 Regulatory Authority Responsibilities

The regulatory authority has analyzed the bond estimates and supporting calculations provided by the applicant. Costs were prepared by the applicant using standard cost estimating references. The references were up to date and were appropriately used in the estimate. Based upon the previous three years inflation trend obtained from the Robert Means Historical Cost Index for Utah, an inflation figure of 6.78 percent has been applied to the bond estimate through 1989. The applicant had applied a 1 percent figure for a two year period.

The applicant has added to the bond a 15 percent contingency fee and a two percent fee for obtaining a contractor, which would be assumed by the regulatory authority should contracting be required. The regulatory authority has applied a 10 percent contingency fee which includes administration and contracting related costs. Contractor's overhead and profit were applied to the labor costs in the regulatory authority review.

Hourly labor costs including contractor's overhead and profit, are as follows:

Laborer	$21.95
Medium Equipment Operator	$28.45
Crane Operator	$29.10
Truck Driver	$22.25
Foreman	$31.35

The final surety estimate for the Trail Mountain mine is summarized as follows:

1.	Surface Facility Removal	$72,579
2.	Earth Moving and Recontouring	$84,207
3.	Riprap	$12,412
4.	Revegetation	$60,389
5.	Miscellaneous*	$74,086
	Total	$303,673
	Add 10 percent contingency	$30,367
	Total 1984 dollars	$334,040
	Add an inflation factor of 6.78 percent over 5 year permit term.	
	Total Surety Estimate	$463,711

*Miscellaneous costs include all monitoring and maintenance related costs for successful reclamation establishment (Permit application, vol. 1, p. 3-76).

16.3 Conditions

None.

XVII. CULTURAL RESOURCES

17.1 Applicant's Proposal

Mining in the Trail Mountain mine area has occurred for over 40 years. In that time, surface disturbance (other than subsidence) has taken place. In 1979, Archaeological-Environmental Research Corporation (AERC) conducted a cultural resource inventory of Cottonwood Canyon, a portion of which overlaps the eastern boundary of the Trail Mountain mine. Five sites and four isolated occurrences were located in the canyon, all of which are outside the present mine plan boundary.

Most of the surface overlying the proposed mine working is unsurveyed for cultural remains. Subsidence projections by the company, based on type of mining (room and pillar - one seam), competence of and depth of overburden and historic subsidence studies in the area indicate that subsidence will be minimal in nature.

17.2 Evaluation of Compliance

30 CFR 779.12 General Environmental Resources Information

(b) No additional surface disturbance is proposed for the current permit term. No known prehistoric or historic sites, that are eligible for nomination to the National Register of Historic Places, are located in the permit area. Areas potentially impacted by subsidence will be monitored and surveyed for cultural resources if warranted by information on subsidence. No impacts to cultural resources are anticipated.

If monitoring and field investigations indicate that additional cultural resources studies are necessary, the applicant will be directed by the regulatory authority to proceed with the required studies.

17.3 Conditions

At such time that the Office of Surface Mining, in consultation with the Division of Oil, Gas and Mining and the State Historic Preservation Officer, determines that subsidence within the permit area may adversely affect known or unrecorded cultural sites, additional cultural resources studies may be required. This determination will be based on new subsidence or cultural resource information and clear justification will be presented to the applicant.

XVII. REFERENCES

1. Davis, F. D. and H. H. Doehlling, 1977, "Coal Drilling at Trail Mountain, North Horn Mountain and John Peak Areas, Wasatch Plateau, Utah," Utah Geological and Mineral Survey, Bull. 112, 90 pp.

2. Lines, G. C., 1984, "Groundwater System and Possible Effects of Underground Coal Mining in the Trail Mountain Area," U.S. Geological Survey Open-File Report 84-067.

3. Price, D. and Waddell, 1973, "Selected Hydrologic Data in the Upper Colorado River Basin, Hydrologic Investigations Atlas HA-477," U.S. Geological Survey in cooperation with Arizona, Colorado, New Mexico, Utah, and Wyoming.

4. USLE (Universal Soil Loss Equation), 1957, From Smith D. D. and W. H. Wischmeier, "Factors Affecting Sheet and Rill Erosion," Trans. Am. Geophysical Union 38, 889-896.

5. U.S. Soil Conservation Service, 1972, "Engineering Manual for Conservation Practices; Chapter 2, Estimating Runoff," U.S. Department of Agriculture, SCS, Washington, D. C.

6. Utah State Unversity, 1968, "Hydrologic Atlas of Utah," Office of Water Resources Research Project No. B-001-UTAH, November, 1968.

ATTACHMENT A

CUMULATIVE HYDROLOGIC IMPACT ASSESSMENT SUMMARY

ATTACHMENT A
Cumulative Hydrologic Impact Assessment Summary
Trail Mountain Mine

Surface Water Hydrology

The Trail Mountain Mine is located on the North Fork of Cottonwood Creek approximately 2.5 miles upstream of the confluence of Cottonwood Creek (North Fork) with the Straight Canyon tributary. Cottonwood Creek is a perennial stream entering the San Rafael River approximately 18 miles southeast of the mine. A spring, approximately two miles upstream from the mine surface facilities provides baseflow to the North Fork of Cottonwood Creek and creates perennial conditions in the reach adjacent to the mine permit boundary. Unnamed ephemeral drainages exist within the permit boundary.

Approximately 65 percent of the streamflow of Cottonwood Creek occurs during the April-June snowmelt runoff period. Average annual precipitation ranges from 17 inches at the Trail Mountain mine to over 30 inches per year at the plateau headwaters. The water is a calcium-bicarbonate type and reflects the influence of the carbonate rocks which cap the ridges and peaks in the basin. Total dissolved solids (TDS) concentrations range from 200 to 400 mg/L (milligrams per liter). Downstream of the cumulative impact area (CIA), water quality is degraded by natural runoff and irrigation return-flows which pass over Mancos Shale-derived soils. The gypsiferous Mancos Shale contributes substantial concentrations of calcium, sodium, magnesium, and sulfate to the surface water system. TDS concentrations in the San Rafael River, 30 miles southeast of the Trail Mountain mine, typically average from 2,000 to 4,000 mg/L. Mine discharge water within the general area is estimated to contain approximately 550 mg/L TDS, based on four years of data at the adjacent Wilberg Mine. The Trail Mountain mine discharges little water to Cottonwood Creek. The sediment pond at Trail Mountain has discharged to Cottonwood Creek only once in three years of record. Data indicates that this discharge was in response to a thunderstorm event.

Geologic Setting

The lower most stratum of importance in the area is the Masuk Shale Member of the Mancos Shale Formation, which outcrops downstream of the Trail Mountain mine. Above the Masuk Shale are: the Star Point Sandstone, the coal-bearing Blackhawk Formation, the Castlegate Sandstone, the Price River Formation, the North Horn Formation, and the Flagstaff Limestone. All but the Masuk Shale and the Flagstaff Limestone outcrop within the permit area boundary. No faults or igneous intrusions are known to exist within the permit boundary.

Ground-Water Hydrology

Ground water in the general area of the Trail Mountain mine occurs in the Blackhawk/Star Point aquifer system and in alluvial aquifer systems, as perched water. Although no springs have been identified within or immediately adjacent to the proposed permit area, many springs within the general area originate in the North Horn Formation of Tertiary age.

At present, ground water enters the Trail Mountain mine at flow rates of eight to ten gpm. The potential exists for more water to be encountered intermittently as mining operations continue and intercept fracture zones and saturated paleo-sandstone channels. The upper limit of potential future mine discharges (ground-water inflow less internal mine consumption) has been estimated to be approximately 125 gpm (gallons per minute). This value assumes that the unit area inflows occurring at the Wilberg mine, where the mine workings intercept numerous paleo-sandstone channels and faults, represent the worst-case mine inflows at the Trail Mountain mine. Given the geologic conditions in the area and the historical mine water inflow at Trail Mountain, such a value is considered a worst-case situation.

Ground-water quality of springs can be characterized as a calcium-magnesium-bicarbonate type, and is similar to that of surface waters in the area. TDS concentrations range from 254 to 695 mg/L and consistently average 372 mg/L. Such values are similar to concentrations observed in the surface waters.

Mining operations have been in existence in the Cottonwood Creek CIA since the 1890's. All anticipated mining within the Cottonwood Creek CIA include: the Trail Mountain mine, the Wilberg mine and the Des-Bee-Dove mine.

Delineation of the Cumulative Impact Area

Surface Water

Below the confluence of Grimes Wash and Cottonwood Creek, stream discharges are of sufficient magnitude that it is unlikely that mining-related impacts can be detected. Therefore, the CIA for the assessment of material damage has been defined as the drainage area contributing to Cottonwood Creek above this location. All present and anticipated mining in this basin is located in the lower one-third of the basin.

Ground water

The lack of piezometric data in the various water-bearing units within the Cottonwood Creek basin does not allow precise determination of ground-water divides in the area. However, the assumption that the ground-water basin coincides with the surface-water basin is well within the limitations and accuracy of the data and assumptions inherent to this analysis. The Pleasant Valley, Joe's Valley, and Trail Canyon faults may act as conduits for interbasin movement of ground water into or out of Cottonwood Creek basin; however, there is little evidence to support this concept. The outcropping of the Masuk Shale within the downstream limits of the CIA, effectively limits the amount of ground water which could leave the basin as underflow. This is the single most important hydrogeologic control and allows delineation of the ground-water CIA.

Summary of Cumulative Hydrologic Impacts

The hydrologic impacts of present and future coal mining activity within Cottonwood Creek basin have been addressed both quantitatively and qualitatively. Quantitative assessments presented in this report focus primarily on surface water impacts which result from the discharge of intercepted ground water. This analysis utilizes average monthly water quality and discharge records from Cottonwood Creek and the Wilberg Mine in combination with anticipated future mine inflows to predict future quality and quantity impacts.

In the CHIA report, the Wilberg mine was used as the main basis of the analysis due to an extensive data base, the large volume of mine water inflow relative to the other general area mines and its greater area of disturbance.

Qualitative analysis of the effect of mine dewatering and subsidence on the ground-water system put particular emphasis on the potential for diminution of spring flows. However, CHIA primarily addressed the Wilberg mine. Since the Trail Mountain mine has no springs on or immediately adjacent to the proposed permit area, this impact was not relevant to the Trail Mountain mine.

Impacts to surface-water quality of Cottonwood Creek are expected to gradually increase over the next 20 years as underground mining operations advance further beneath East Mountain and Trail Mountain. The primary impact is associated with the discharge of intercepted ground water which is expected to reach a maximum between the years 2000 and 2005. Impacts are quantified by flow-weighting the estimated TDS concentrations of the mine discharge water with that of the average monthly water quality and discharge of Cottonwood Creek. The maximum predicted impacts for this period indicates that the highest concentration of TDS is predicted to occur in the month of March, reaching 375 mg/L. This represents an increase of 53 mg/L over the background TDS concentration, or approximately 16.5 percent. This contrasts with the increase of over 1,500 mg/L TDS, resulting from irrigation return flows in the reach of Cottonwood Creek immediately downstream of the CIA.

The Utah Division of Health specifies a maximum recommended TDS concentration of 1,200 mg/L for agricultural use (irrigation and stock watering). TDS limitations for other uses are adjusted on a case-by-case basis. The U.S. Public Health Service provides guidelines for drinking water standards which recommend a maximum TDS concentration of 500 mg/L for primary standards and 1,000 mg/L for secondary standards. Additionally, the U.S. Environmental Protection Agency (EPA) has published recommended limits for various irrigation hazards and industrial uses.

As a result of all anticipated mining, a maximum increase of 53 mg/L in TDS in Cottonwood Creek (yielding a TDS value of 375 mg/L) will not degrade or preclude anticipated uses below the CIA. This is in contrast to the marked degradation which presently occurs downstream of the mined area due to irrigation activity on Mancos Shale soils. This activity increases TDS concentrations to levels which exceed the recommended limits for almost every use.

The maximum increase in the discharge of Cottonwood Creek can be estimated by assuming that all of the ground water which is intercepted by mining activities is "new" water to the basin (i.e., that which would not be present normally). This assumption is overly conservative but serves to define an upper limit on the magnitude of the potential increase.

Similarly, the maximum decrease in streamflow during the hydrogeologic resaturation period following the cessation of mining can be estimated. By assuming that the diminution of natural streamflow during this period is equal to the peak rate of mine dewatering (ground-water recharge and storage components), the upper limit of potential streamflow reduction can be estimated.

The greatest percent change occurs during the non-irrigation season, November through April. Changes to the average monthly flow of Cottonwood Creek during the growing season are less than five percent. Thus, even if changes to the ground-water system were as great as these conservative estimates indicate, the timing of the impacts within the yearly cycle is such that minimal impacts occur during the period of greatest demand, May through October. This is due to a combination of effects, including the natural hydrologic cycle, regulation of Joe's Valley Reservoir, and the anticipated amounts of future mine dewatering based on present inflow rates, basin characteristics, and seasonal effects.

After mining is completed, strata dewatered during the mining process will become resaturated. This will result in the loss of water discharged to the surface-water system during mining (approximately 4 cfs). This represents four percent of the mean daily flow rate of Cottonwood Creek. Seasonally, the largest percent depletion of discharge during mining will occur during the non-irrigation period, November through April, where average monthly flows may experience depletions of 20 to 30 percent. Since the Trail Mountain mine will intercept little ground water, insignificant base flow diminution will be attributable to the Trail Mountain mine.

Impacts Associated with Subsidence

No subsidence cracking or mass movement has been evident in the proposed permit area. In adjacent areas (the Deer Creek mine which drains to Huntington Canyon), subsidence effects have been limited to topographic modification in the form of a broad, swale-like trough. There are two factors which limit cracking and mass movement. First is the presence of the massive Castlegate Sandstone, which is resistant to caving and separates the mine workings from the major spring-bearing formations. Second is the presence of substantial thicknesses of clay shales in the overburden which tend to swell and seal internal tension cracks.

Where the Castlegate Sandstone outcrops or is absent, a greater potential exists for subsidence effects to alter the hydrologic balance of the area. Tension cracks have a greater opportunity to extend to the surface, thus rerouting surface and sub-surface flow into the mine workings. Topographic modification of surface features may result locally in increased erosion rates, areas of closed drainage or other undesirable surface effects. Risk of damage to the hydrologic system decreases in the direction of increasing overburden thickness.

Since there are no springs within or immediately adjacent to the proposed permit area, subsidence effects are not considered a potentially significant impact.

Finding

The Trail Mountain Mine operation is essentially dry. Indications are that the only ground water intersected is ground-water flow through fractures from surface precipitation. Future characterization of regional ground-water occurrences in the Star Point and Blackhawk formations may be necessary if the applicant were to propose any expansion of operations. Currently no subsurface aquifer is encountered, the acreage mined is small, and approximately two years of mining remain in the current leases.

The Trail Mountain permit application, the Cottonwood Creek CHIA report, and the Trail Mountain technical analysis discussing the impacts of all anticipated mining on the hydrologic balance, with respect to the Trail Mountain mine, has shown that the coal-mining operation has been designed to prevent material damage to the hydrologic balance outside the permit area, over the entire projected life of the proposed mining operation.

ARCH OF UTAH
Trail Mountain Mine
P.O. Box 550
Orangeville, Utah 84537

June 16, 1987

Secretary
Board of Oil, Gas and Mining
3 Triad Center/Suite 350
Salt Lake City, Utah 84180-1203

RE: Proposed Assessment Information on NOV 87-26-2-2 issued to Trail Mountain

Dear Sirs;

Trail Mountain would formally submit to you and the Division this written statement pursuant to Notice of Violation N 87-26-2-2 issued to the Trail Mountain Mine May 27, 1987. We would hope that you would use this information in determining the facts and circumstance surrounding the issuance of NOV 87-26-2-2 and also to use this information to help in determining the amount of assessment, if any.

This NOV contains two parts. Part A reads: Failure to dispose of waste oil in accordance with the approved permit.

Trail Mountain's 1985 approved MRP ACT/015/009 Appendix 3-2 states: "Waste oil is collected at the mine site in a large waste oil tank and is disposed of in an approved manner by Ashworth Trucking." Ashworth Trucking was never able to provide this service for Trail Mountain and with no other service locally available, Trail Mountain started the practice of "disposing of the waste oil in an approved manner" by dumping waste oil onto our coal stockpile as a dust suppressent and a BTU inhancement. Once the waste oil is dumped onto the coal stockpile, the stockpile is loaded into trucks and hauled to the point of use.

This disposal practice has been in place since early 1985 and has been expressed to all regulatory agencies and also in all mine correspondence concerning waste oil disposal. (See OSM mine site evaluation inspection report dated 4/16/86).

It is Trail Mountain's contention that this waste oil disposal method is in an approved manner as stated in the MRP. It is also felt that any changes in an approved permit, such as deleting the words "Ashworth Trucking", could take place in the arena of the min-term permit review which is presently being conducted at the Trail Mountain mine site. The abatement time for this NOV is the due date for the Trail Mountain response to DOGM's mid-term review, at which time the wording in the Tract 1 MRP will be changed to reflect current practice.